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A SUMMARY OF INFORMATION ON *PINUS CONTORTA*
with special reference to its use in Europe

By

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with notes on Entomology and Pathology by MYLES CROOKE and J. S. MURRAY
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7. EARLY GROWTH OF THE SPECIES AS AN EXOTIC

Individual trees have been growing in parks and gardens in Europe for many years, but interest in the species as a forest tree appears to have originated in Finland.

(*a*) *Finland*—From 1922 onwards a number of reports were published on the growth of *Pinus contorta* in Finland, where some plantations were reaching the production stage. Results, both in height growth and in basal area, volume, and yield at first thinning, were becoming evident [108–110]. Hiley [55] commented that the growth of these plots compared very favourably with the best growth of Corsican Pine in Britain. Sample plots established there in 1926 were remeasured when 39 years old and the results reported by Miettinen [78]. He quotes the sample-plot data and concludes that the total growth of Lodgepole is about 65% higher than that of an adjacent Scots Pine stand and almost 35% higher than a Norway Spruce stand. This result was obtained on a clay-soil *Pyrola* forest type, not so suitable a habitat for Scots as for Lodgepole. Miettinen concludes that owing to its slender branches, good stem form, light-coloured wood, weak heartwood formation and very rapid growth, Lodgepole is a particularly good producer of raw material for the cellulose industry. These plots average a dominant height of 17·7 m. (58 ft.) and a total production of 384 cu. m. (4300 cu. ft.) over bark. For Britain, yield tables [57] show that the corresponding data for quality-class I Scots Pine are 58 ft. and 4970 cu. ft. respectively.

(*b*) *Sweden*—Lagerberg [63] described plots, probably of the Lodgepole variety, at Bjurfors, the oldest 30 years old (from seed ?) in 1929, and 8 m. (25 ft.) high, while an 18-year-old stand at the same place had a mean height after the first thinning of 6·75 m. (22 ft.), a total yield of 73 cu. m. (821 H.ft.) and a mean annual increment of 4·05 cu. m. (46 H.ft.), a result better than quality-class I Scots Pine in Britain, as there were some unmeasured trees of other species in the plot. The net yield is also larger than would appear, as the bark of Lodgepole is thin. He considered that this Pine required a good, moist soil, and under such conditions it needed less weeding than Scots Pine. Sylvén [106] considered that Lodgepole Pine might have a permanent place in Sweden, as judged by growth at Grensholm, and that the Shore Pine was also doing well.

(*c*) *Denmark*—Experience with exotics in Denmark, summarized by Larsen [66], showed that *Pinus contorta* (i.e. Shore Pine) and *P. murrayana* (inland Lodgepole Pine) are also used to some extent in exposed sites but they do not appear to thrive. *P. murrayana* is the better of the two, but they are both attacked by *Evetria buoliana* with consequent deformation of the stem. The use of Lodgepole on the sandy soils of old open-cast mine workings is described by Christensen [15]. In a more recent paper by Løfting [71] a much more favourable account of the coastal provenance is given, stating that it grows faster, at least in youth, and has a greater production, although it is often of bad form and suffers from pests. Thaarup [107] states that the coastal Pine grows well on dunes, where it regenerates naturally. The inland form is less vigorous and so less useful.

(*d*) *Faroe Islands*—Experimental work on tree planting on these exposed islands, with a markedly maritime climate, has shown that *Pinus contorta* from the north Pacific coast of America is of pre-eminent value, and it appears to suit the shallow, often peaty, soil. It is considered as a pioneer species, preparing the ground for more valuable species. The height growth is 10–24 in. annually, and though it has difficulty in taking root in the wet soil, and may blow down, no other species keeps so healthy [30; 40].

(*e*) *Norway*—Helstad [53] reports that Lodgepole Pine of Finnish origin was planted in 1929 and though much was destroyed by settlement and sheep-grazing, the small surviving stand has grown faster than Scots Pine.

(*f*) *France*—Pourtet and Duchaufour [90] have stated categorically that only the Lodgepole Pine is of interest in France, the Shore Pine being of bad form and slow growth. They deduced that until World War I only the latter variety had been introduced to France, because of the mediocre results obtained. Lodgepole has given good results on the most difficult of soils, whether calcareous, dry siliceous or peaty, as also in climates which are severe either because of spring or summer drought, or low winter temperatures.

(*g*) *Belgium*—A report on the Shore Pine planted in 1914 in the Campine, noted its resistance to drought and its usefulness as a pioneer, the lower branches not dying but suppressing the undergrowth. The writer concluded that the question of seed origin must be considered, careful selection possibly enabling valuable silvicultural characteristics to be combined with useful timber production [3]. Nevertheless, Pardé [86] concluded that Shore Pine is of little interest to Belgium, though it has shown some success and may be useful on sand dunes. Lodgepole is superior, growing fairly rapidly, and is used on dunes in Flanders.

(*h*) *Russia*—Girgidov [42] states that Lodgepole is rare in the U.S.S.R. except in the Karelo-Finnish S.S.R., Estonia and Leningrad province. There its growth is rather faster than Scots Pine; it is resistant to frost and needle-cast, and unexacting as to soil. The timber is of good quality, possibly valuable for pulping, but the tree does not lose its branches easily.

(*i*) *Central Europe*—Lagerberg [63] refers to a large plantation near Nuremberg, Germany, planted about 1890, which was a complete failure, probably owing to the use of an unsuitable strain of tree. He states that most plantations date from after 1910. In 1923, Emeis [28] described Lodgepole Pine on the dunes and heaths of Schleswig-Holstein, remarking on the outstanding appearance of its long leading shoots, which he likened to cannon ramrods, in the young plantations. Owing to its tendency to spread out, impeding its neighbours and becoming a wolf tree, he recommended that it be used either to beat up gaps in older plantations or for mixing in 4- to 6-year-old plantations of Norway Spruce, Mountain Pine or Silver Fir.

After the success of the Finnish plantations had been made plain by C. G. Tigerstedt [110], many writers commented on the desirability of planting more of the species, especially with the idea of increasing supplies of pulpwood, e.g. Schulenburg [103], Metzger, Lindfors and Engelbrecht, all of whom advertised the Finnish results. Continental European opinion was therefore all in favour of the Lodgepole variety. Lagerberg [63] referred to it as a wide variety of geographical forms. On account of its good growth, he considered *P. murrayana* to be of the most silvicultural value. The Shore Pine he characterized as up to 22 ft. in height, often much smaller, and rarely over 35 ft., with relatively coarse and stiff branches, and a dense, round-topped crown, resembling Mountain Pine. Schulenburg [103] went further, asserting that the coastal race had almost no value at all, and that this had been confirmed by trial at Mustila, Finland; but he does add in a footnote that in Sweden, Sylvén has cited examples of coastal Pine with straight stems. Růžička [102] describes its employment in Czechoslovakia, noting its good growth on the poorest kinds of heather and peat soils, and Tuzson [111] remarks on its rapid growth, healthy development and drought resistance on an estate in Hungary.

(*j*) *Eire*—The oldest trees (except some at Avondale) "occur in Ballyhoura forest in County Cork about 12 miles north of Malloy. . . . The oldest trees are those planted in Compt. 11 in 1918" [37]. According to Forbes [31], "The chief use of *P. contorta* (coastal provenance) is that of a nurse tree on poor soils, where it forms a dense crown, providing a close canopy, and a thick humus layer. *P. murrayana* (inland provenance), on the other hand, not only grows slowly, but forms no canopy unless planted extremely closely. The two types appear in this country to reverse their characteristics as timber producers, the Lodgepole Pine (i.e. *P. murrayana*, the inland provenance) giving little indication of reaching timber size, while the other (coastal) has in several situations reached a height of 60–70 ft. . . . Trees . . . planted side by side at Avondale, County Wicklow, . . . clearly depict [photograph] the characteristics and relative rates of growth of the two types, the former being full 50% higher than the latter (*P. murrayana*) in the course of 10 years". Based on these early plantations, Forbes [32] remarked on the value of *P. contorta* for the "reclamation or soil improvement of poor ground. . . . Its ultimate development as a timber tree has yet to be seen, but for improving surface conditions it deserves a place in many mixtures where Pines of some kind can alone be grown".

Wittich [117], after his tour in Ireland, notes that the growth of *P. contorta* in youth was very satisfactory, but doubts whether older crops, which would need more space for their root systems, would continue to find conditions satisfactory for continued life. He remarks that Lodgepole has a deeper root system than Scots Pine, sometimes right down to the pan, and he considers Lodgepole much less sensitive to lack of soil oxygen.

Deasy [22], reporting on 15 years' growth on sand dunes at Curracloe, County Wexford, states that, taking all factors into consideration, *P. contorta* is fifth in the order of safety, better Pines being *P. pinaster*, *P. radiata*, *P. nigra* var. *austriaca*, and *P. nigra* var. *calabrica*. Redmond [93] remarks on its use on difficult sites where experience has shown that other species cannot be established, and for replanting areas of Spruce or Scots Pine which have failed or gone into check. O'Kelly [84] gives results of successful crops on sites where both Corsican and Scots Pine have failed, one giving a total yield of 1930 H.ft. at 17 years, and also cites its beneficial nursing effect when mixed with Scots Pine that has gone into check. He recommends it for windbreaks owing to its ability to stand exposure. He describes *P. contorta* as a "volume producer of no mean ability on poor soils. . . . Without it . . . much of the land now considered suitable for re-afforestation, would be regarded as a liability".

A rough survey [4] of Northern Ireland State plantations carried out in $\frac{1}{10}$-acre sample plots covering some 140 stands comprising 2000 acres planted between 1927 and 1936, indicated that the average yield may be expected to be comparable to quality-class I Scots Pine. The Lodgepole Pine was planted on land on which Scots Pine or Sitka Spruce had failed, or which had been considered too poor for such species, and little ploughing or other ground preparation had been done. From a study of 50 plots it was deduced that crookedness of the stem might be the result of poor soil-drainage conditions. No distinction was made between Shore or Lodgepole Pine in the survey, and it was stated that opinions varied as to which was the most suitable for planting.

(*k*) *Isle of Man*—Bennett [10] noted the fast growth of a young plantation of Shore Pine but considered Lodgepole a better subject, being sturdier and shorter in its growth, and likely to stand the exposure better. Duguid [24], 12 years later, reports similarly, the Shore Pine making too fast a growth in the early summer, especially on the more fertile soils. Although Lodgepole is less liable to windblow and broken leading shoots, it does not generally make such good progress in difficult situations.

(*l*) *Australasia*—Little has been published about Lodgepole Pine in New Zealand and even less in Australia. Lindsay [69] gives evidence of very rapid growth in New Zealand (45 ft. in 17 years) and Perham [88] stated that 11,500 acres had been planted by 1938, although possibly not from seed of the best provenance, which he stated to be the Prince Rupert District. It is reported [83] that in elevated, exposed conditions Lodgepole Pine (and *Pinus ponderosa*) were the most thrifty species, being better than all other Pines, though the trees were of poor form and branchy. From correspondence with the Research Station at Whakarewarewa, it appears that the differences between the green coastal provenances and the much yellower foliage of the inland provenances that have been noted in Britain, also obtain in New Zealand.

(*m*) *Britain*—Although older individual trees exist in Britain, the oldest plantation so far traced is that at Ruttle Wood, Beaufort Estate, in eastern Inverness-shire. It was planted about 1910–12 and is clearly of a coastal provenance. In 1922 an experimental plantation of plants from Ireland, raised from imported seed of coastal origin, was made near the dunes in Culbin forest, Morayshire. It is now the oldest sample plot of the species. The data are as follows: age 30 years; top height

47 ft.; mean girth 18 in.; standing volume per acre 1220 H.ft.; total production to date 2029 H.ft. and a periodic mean annual increment over the last 3 years of 146 H.ft. This is equal to Scots Pine of quality-class I in height and rather less in present volume, though greater in increment (Plot S.136). In the same year a plantation was established at Auchterawe in Inchnacardoch forest, Inverness-shire, and a sample plot maintained there from 1941 to 1949. Unfortunately the trees were attacked by *Fomes annosus* and suffered windblow, and the crop has been severely damaged. The data were: age 27 years; top height 41 ft.; mean girth 16 in.; standing volume per acre 1590 H.ft.; total production to date 2150 H.ft. This is slightly below average quality-class I Scots Pine (Plot S.135).

Planting of Lodgepole Pine did not become general until about 1930, though some was used experimentally and the sporadic seedlings that were frequently found in seedbeds of Sitka Spruce and Douglas Fir were utilized. It was reported that "*Pinus contorta* from British Columbia and selected parts of the Rocky Mountains is a rapid starter on poor soils and is useful for filling in gaps in plantations" [33]. Thus its first use, as in places on the Continent, was for beating up, but this was soon extended and it was reported that "Experimental plots on the poorer types of peat in the north and west of Scotland are giving encouraging results. On this type of ground *Pinus contorta* is proving a very useful species. . . . Experience has shown, however, that a small dose of phosphatic manure such as basic slag or ground mineral phosphate, applied at the time of planting, is a requisite for success on the worst forms of peat" [34]. Early reports on its success at Gwydyr forest, Caernarvonshire, are described by Long [72] and more details of the experimental plantings by Guillebaud [46] and Macdonald [74]. A summary of its silvicultural qualities and uses, with special emphasis on the coastal provenance, is given by Anderson [2].

"The hardy Pines, such as Scots Pine and *Pinus contorta*, are true pioneer species, although for various reasons, e.g. liability to snowbreak, they are often inferior to the Spruces as timber-producing trees on the sites in question. As a result of much experiment it has been found that on these poor soils the establishment of Spruce can be greatly accelerated by planting an admixture of one of the Pines. The Pines grow rapidly and, when their lower branches have spread sufficiently to smother or weaken the heather and to provide shelter, the Spruce begin to grow also and eventually take over the lead. The planting of Pine in mixture with Spruce is now general practice on all soils on which Spruce behaves as a non-pioneer (or so-called 'successor') species" [35]. This use of a species of Pine in mixture with species which are less successful in establishing themselves, in order to act as a form of 'nurse' species, is described by Robinson [97], who wrote "Scots, Contorta, and Mountain Pines have all been used in mixtures with Norway and Sitka Spruces. In every case there has been a marked response, though the different Pines vary in efficiency. Probably it will be found that the order of usefulness is Scots and Corsican, Mountain and lastly Contorta Pines, though the status of Contorta is not yet definite".

On the poorest land, the growth of Lodgepole is better than that of Scots Pine. The data for relative growth on peat are given by Zehetmayr [124] and similar results may be expected on shallow peat over hard mineral soils, especially in exposed situations. The area of Lodgepole Pine plantations recorded in the Census of 1947–49 was 3260 acres, of which there were 828 acres in England, 1949 acres in Scotland and 483 acres in Wales. The proportions in state and private forests were 3083 and 177 acres, approximately half the total area being pure and half in mixture with other species. The distribution by age classes was: 1–10 years—939 acres, 11–20 years—2014 acres, 21–30 years—165 acres, 31–40 years—4 acres, over 40 years—138 acres [36].

Gradually the use of Lodgepole Pine has increased. In the Forestry Commission annual reports, imports of seed of Lodgepole were separated from other species for the first time in 1946 and rose rapidly to an average of nearly 500 lb. a year. The number of plants used was shown separately for the first time in 1948, and in 1953 had risen to 8,413,000, of which 7,000,000 were used for new planting, equivalent to an area, if planted pure, of some 3500 acres (excluding plants used for beating up), or probably double that area in mixtures. There are now probably some 12,000 acres of Lodgepole plantations in Britain. To some extent these figures are a reflection of the poorer quality of the land now being planted. The important point is that, in general, the poorer the conditions the more outstanding is the growth of Lodgepole Pine when compared with other species, while on good ground it is seldom an attractive tree from any point of view. On good soils not only is its coarse growth accentuated, but it tends to sway and blow down in strong winds. In any case, there is no object in planting this tree on sites which give no trouble for the ready establishment of species that are more valuable and produce a greater volume. The bad form, branchiness, liability to snow breakage and generally unattractive appearance are less marked in the Lodgepole Pine than the coastal types, and hence the former is frequently preferred. But the coastal type has definite advantages in some cases, as on sites where the establishment of a tree crop is extremely difficult. It can now be planted on such

sites, hitherto considered 'unplantable', after preparation by tractor-drawn ploughs of heavy draining (Cuthbertson) or ripping (Tine) types. Even on the deepest peats (the moss or bog formation) characterized by *Trichophorum* (*Scirpus*) *caespitosum*, where the tree roots can never reach the mineral soil, young plantations are being raised successfully on an experimental scale with the aid of coastal *Pinus contorta*. The objectionable form and possibly poor quality of the timber require that when possible a second more valuable species be used in mixture. It is necessary to assist the second species, and on the poorest sites the Lodgepole Pine as well, with phosphate. This is described in detail by Zehetmayr [123].

The exposure-resistant quality of coastal Lodgepole is of special value in the west of Britain where the climate, combined often with exposure to salt spray and highly acid, wet soils, is unsuited to Scots Pine. Lodgepole also does better than other species on dry, thin or rocky soils in the drier east of the country, and it is for such sites that the inland provenances are sometimes preferred. No doubt there is scope here for differentiation between provenances, but the data for their use are as yet inadequate. Details of more recent experimental work in trial plantations, shelter blocks and shelterbelts, where Lodgepole Pine of different coastal and inland provenances plays an important part, are given in [120]. The ability of Lodgepole to develop a more vigorous root system than other species on these poor upland heaths is demonstrated by Yeatman [121]. It is recommended for shelterbelts on upland farms [48; 73] instead of Scots Pine on the more difficult sites, and the value of the coastal provenances for such purposes is also emphasized [112]. It is used successfully on sand-dune areas, as at Culbin forest, Morayshire, Newborough forest, Anglesey, and Pembray forest, Carmarthen, although in places it has not grown well, possibly owing to the effect of sea spray or to excessive soil alkalinity. In conclusion, Lodgepole Pine may be described as a species that is not favoured where any other species will grow successfully, but which has many advantages in the afforestation of difficult sites, both pure and in mixture with other species [37].

8. Silvicultural Notes

Seed—Pinus contorta bears cones freely from an early age. They may persist on the tree for several years. This habit is one of the reasons for its success as a pioneer species after fire, as the cones are opened by the heat and release their seed. The seed is small; average data for the U.S.A. [114] are as follows:—

	No. of clean seeds per lb.			*Soundness*	*Extraction conditions for dry cones*
	Low	*Average*	*High*	*%*	
Shore Pine . . .	111,000	135,000	165,000	70	6–8 hours at 140° F.
Lodgepole Pine . .	38,000	102,000	160,000	97	ditto

Seed is produced at an early age in Britain, but the yield so far has been small. Anderson [2] states that the yield is 6 oz. per bushel of cones. Scottish data from over 1000 bushels collected from 1951 to 1953 show yields from 2 to 4 oz. with a mean of about 2½ oz. per bushel, but rather higher yields are frequently obtained. The number of seeds per lb., unsorted (i.e. as cleaned commercially), has been found to vary from 130,000 to 222,000 (mean 160,000–180,000) in collections from trees of different provenances, mostly from Lodgepole-Pine-type trees [37]. Stratification of the seed at a temperature just above freezing point for 30 to 60 days is recommended by Barton [6] and D'yachenko [25]. The benefits of early sowing have been demonstrated in a series of experiments [33] repeated over several years. Guillebaud [45] showed that stratification of seed that had been in store for a year increased germination by 88 to 300%. The production, extraction and germination of Lodgepole Pine seed in Colorado and Wyoming was studied in very great detail by Bates [9] in connexion with a project for the direct sowing of felled areas on a large scale.

Nursery Work and Planting—No differences from normal usage for species of Pines appear to have been recorded [5]. The best age and type of plant, the methods of planting, and thinning treatments in use in Ireland are described by O'Kelly [84]. Experimental data for plantations on peat with reference to age and type of plant are given by Zehetmayr [124]. In Scotland, Lodgepole seed is now generally sown in the modern woodland- or heathland-type nurseries, which produce large 1-year seedlings fit for lining out and for providing a 1 + 1 plant that can be used very successfully in the forest. Plantations made with seedlings have varied in their success, but where a large plough is used on land with sparse vegetation which is not liable to recolonize the plough ridges quickly and stifle the young tree, seedlings are often successful [37].

Mixtures—In Britain, on the most extreme sites, the proportion of Lodgepole in mixtures is necessarily high, as it is uncertain whether the second species will grow. Under such conditions, a 3/1 mixture of Lodgepole Pine with Sitka Spruce, Japanese or hybrid Larch, several species of Fir or *Tsuga heterophylla*, has been used experimentally, with one line of pure Lodgepole and the next of alternate plants of Lodgepole and the second species, and so on. Small rings of six plants of the second species round two central Lodgepole, and surrounded entirely by Lodgepole, have also been used, as well as other patterns. Such intimate mixtures are valuable under the most extremely adverse conditions, each plant of the more sensitive species being surrounded by the Lodgepole 'nurse'. Difficulties occur in mixtures composed of alternate plants if the Lodgepole grows too fast, as its removal denudes the sensitive species of assistance and shelter. Conversely, on some less extreme sites, as Zehetmayr [124] indicates, such intimate mixtures are hard to retain because the second species (e.g. Sitka) grows too fast once the canopy has closed. Hence on sites where it is anticipated that the sensitive species will not need the maximum 'nursing', a 50/50 mixture is normal, three rows of Lodgepole alternating with three rows of Sitka or Norway Spruce, or other sensitive species. In some places a 2-row/2-row mixture has been used. Chequerboard mixtures of 9 plants in a square are also employed. Few mixtures have yet attained sufficient size over a wide enough range of conditions for any conclusions to be drawn.

Damage by Animals—One of the disadvantages of Lodgepole Pine is its attraction for roedeer. They are fond of chewing the bark, and when Lodgepole has been used for beating up in small groups, it may suffer severely. Macdonald [75] notes that the coastal type suffers less severely than the inland; the heavier branch system of the former tends to keep the animals away. Pines also suffer damage from blackgame, especially in periods when their numbers are high, but Lodgepole does not suffer as much as Scots Pine, e.g. at Borgie forest [124]. Allman [1] records a case where hares preferred Corsican Pine and left Lodgepole and Scots Pine undamaged.

9. Utilization Notes

Information on the timber properties and uses of Lodgepole Pine is well summarized by McElhanney *et al.* [77]. "The wood is light in colour, the sapwood sometimes being almost white. It is soft, straight-grained, and of fine uniform texture. It takes a good finish, and though, on account of its size, it does not produce much high-grade lumber, it yields a good grade of small tight-knotted stock, in quality not dissimilar to that of Engelmann Spruce or Jack Pine. Lodgepole Pine seasons easily and uniformly. It is of medium durability. It is not very resinous and takes paints and varnishes satisfactorily. It has good nailing properties and is suitable for boxes. *Typical uses:* Railway ties (especially if treated), telephone and telegraph poles (treated), piling, light and medium construction shiplap, boxes and crates, mining timbers, grain doors". It was Lodgepole that provided the ties or sleepers for the Grand Trunk Pacific Railway through the Prince George region in 1913–14 [38]. LeBarron [68] notes that Lodgepole was used for railway ties or sleepers in Montana in 1860–80, and then interest in the species declined until about 1930. By 1945 it was in great demand for high-grade paper pulp, but the highest stumpage value was for transmission-line poles. Its use for this purpose, in comparison with Douglas Fir and Western Red Cedar, is discussed by Grantham [43].

Betts [11] reports that "It has a moderately large shrinkage—somewhat less than the coast type of Douglas Fir but slightly greater than the Rocky Mountain type. In strength properties, it rates as moderately weak, moderately stiff, moderately soft, and moderately low in shock resistance. . . . Tests on Lodgepole Pine grown in the Rocky Mountain regions indicate that it has excellent paper-making properties. Wood from these regions contains comparatively little pitch [resin]* and reduces readily by the sulfite process to produce an easily bleached, strong pulp of excellent colour which is suitable for the manufacture of paper such as newsprint, wrapping, book and high-grade printing. The wood with comparatively little pitch can also be ground readily by the mechanical process to yield a pulp of satisfactory colour and strength, but the power required is about 20% more than for White Spruce—a wood long used for groundwood pulp. When pulped by the sulfate process, which can be applied satisfactorily to woods containing considerable pitch, Lodgepole Pine produces a very strong, dark-coloured pulp suitable for making high-grade kraft wrapping papers and fiberboard" [11]. "Lodgepole Pine kraft pulp is very desirable for blending with and improving the properties of old-growth Douglas Fir kraft pulp. The Lodgepole Pine produces a pulp with a high bursting strength with which it is possible to offset the low bursting strength of the Douglas Fir pulps while still retaining the high tearing value of Douglas Fir" [85].

* The coastal form contains more.

In Europe, Schulenburg [103 and elsewhere] and others repeatedly recommend the use of *P. contorta* for paper pulp, owing to the greater volume of timber yielded compared with native conifers, but no tests appear on record.

O'Kelly [84] refers to its use for electricity transmission poles in Ireland, but the cheapness of the timber was nullified by the extra amount of creosote it absorbed, in comparison with other species in use. In Britain, Zehetmayr [124] notes that one consignment of the very earliest thinnings was tested and found to be less dense and less strong than average pre-thinnings of Scots or Corsican Pine, but that is the only data available and it may or may not be of general applicability. In East Scotland it is reported that straight pitprops with pronounced but not heavy whorls are produced, acceptable by collieries when peeled and dressed. Unbarked material quickly becomes discoloured. Small boards from thinnings yield a hard timber, rather like imported *Pinus pinaster* [37].

10. Entomological Notes

There are remarkably few published references dealing with the insects associated with *P. contorta* in Europe, and not one that covers the subject at all exhaustively. A few of the most important Pine insects are mentioned by writers such as Tigerstedt [110], who records *Myelophilus piniperda* L. and *Neodiprion sertifer* Geoffr. on *P. contorta*; by Løfting [71], who mentioned *Evetria buoliana* Schiff. as being a pest of some note; and by Thaarup [107], who supplements the preceding statement by saying that the attacks of this species are more severe on the coastal than on the inland type. In Great Britain, although no detailed studies have been made, it is known that many of the more important insect species associated with Pines occur on *P. contorta*. These include, for example, *Hylobius abietis* L., *M. piniperda*, *Bupalus piniarius* L., *E. buoliana*, *E. turionana* Hbn., *Diprion pini* L. and *Neodiprion sertifer*. Crooke [17] records that attack by *E. buoliana* has more damaging results on *P. contorta* than on either Scots or Corsican Pine, whereas Scots Pine is more severely attacked than *P. contorta* by the closely related *E. turionana*. In general it can be assumed that, at least in Great Britain if not in Europe as a whole, the insect fauna associated with Scots Pine can also occur on Lodgepole and that on the latter host the intensity of attacks and their silvicultural implications are of much the same order as for Scots Pine.

11. Pathological Notes

In America, Pierson and Ehrlich [89] describing a cold spell in Northern Idaho in October and November when minima of −9° and possibly −16° F. were recorded, listed *P. contorta* in the slightly damaged group, with 'some browning'. Henson [54] also describes a browning of the needles in the Rocky Mountains. This is attributed to the desiccating action of 'chinook' winds blowing when frost in the soil prevents the trees drawing on water for transpiration. Roth [101] reported that *P. contorta* suffered little or no damage from late frosts in Hungary. It has proved equally hardy in Bavaria [100] and in the severe winters in Finland [62]. Hunter-Blair [58] described the results of an April frost of 16° F. in 1945 in Ayrshire and said that *P. contorta* suffered 'slight losses'. In the Loch Ossian plantations at Corrour, Inverness-shire, Macdonald [37] reported the browning of needles as a result of cold spring winds from the north. The south-west sides of the trees facing the usual prevailing winds were untouched. Other species suffered more severely. In the severe late frost of May 1935, *P. contorta* was reported to have suffered to about the same extent as Corsican Pine, which was undoubtedly more injured than Scots Pine. In a few areas, detailed counts were made and it was noted that the damage, though frequent, was seldom more than moderate [21]. Other cases of dieback of shoots and browning of needles of *P. contorta* have been recorded from several forests in North Wales, North England and Scotland (and see section 6 above). In two instances, Day [20] ascribed this damage partly to frost and partly to poor site drainage. On the needles of such trees, *Lophodermium pinastri* is usually abundant but possibly secondary. Day emphasizes the difference in susceptibility towards frost damage displayed by various strains of *P. contorta* and points out the need for care in choosing the best strain. Roeser [99] recorded that the seedlings were not resistant to heat injury when very young but improved as they aged. In comparison, Douglas Fir was less resistant and Western Yellow Pine more resistant.

Although these do not exhaust the references to climatic damage on *P. contorta*, they do indicate that it is resistant to exposure and frost injury and that some strains are better than others in this respect.

Neilson-Jones [81; 82] described 'fused-needle disease' on young *P. contorta* at Wareham in Dorset. Characteristic symptoms were distortion and fusion of the needles accompanied by stunting of growth.

The trouble was considered to be physiological, deriving from the marked infertility of the site where the disease occurred. Addition of certain composts, and also transference to a better-quality site, improved the condition of affected trees.

The literature describing diseases of *P. contorta* in Europe is not extensive, on account of the comparatively short time that the species has been planted on a forest scale. For this reason, most of the references relate to the last decade and are descriptive of the tree in the nursery and in young plantations.

Emeis [28] referred to attacks by fungus in the dune and heath plantations of Schleswig-Holstein, similar to those on Austrian or Black Pine, but at an earlier age. Kujala [62] described the more important fungi attacking *P. contorta* in several regions of Finland. In one area *Fomes annosus* proved to be a serious root rot. Elsewhere shoot dieback was caused by *Sclerophoma pityophila* and *Crumenula abietina*. Profuse resin exudation from stems in another stand was associated with *Crumenula sororia* and *Dasyscypha subtilissima*, but the author considered that the attack of the two latter fungi might be brought about by the conditions within the stand, i.e. presence of dead branches on the stems and a damp site. Løfting [71] mentions the liability of *P. contorta* to attack by *Dasyscypha calyciformis* and *Trametes pini*.

In Scotland, sample plot S.135 at Inchnacardoch forest, Inverness-shire, was attacked by *Fomes annosus* and destroyed by windblow.

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ABSTRACT SECTION

0. FORESTS, FORESTRY, AND THE UTILIZATION OF FOREST PRODUCTS: GENERAL

For general *regional* accounts see section 90

TRANSLATIONS

See Nos. 95, 824, 856, 873, 890, 951, 1174, 1178.

0 (048.1). BIBLIOGRAPHICAL LISTS

See also Nos. 133, 145, 498, 527, 821, 915, 980, 1035, 1113, 1181, 1330.

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With a combined author, subject, etc. index.

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Previously *Pol'ana.* Vol. 1 (10), No. 1, under the new title, was issued in Jan., 1954. Citation in *For. Abstr.*: *Les, Bratislava.*

4. ***Prehl'ad Lesnickej, Drevárskej, Celulózovej a Papierenskej Literatúry.*** Štátne Nakladatel'stvo Technickej Literatúry, Hurbanovo nám. 6, Bratislava. 10 nos. p.a. Price *Kčs.* 100 p.a. (single copy *Kčs.*10). P.R.
An abstracting journal covering forestry, wood, pulp and paper technology. Published under the aegis of the Czechoslovak Ministry of Forests and Wood Industry, in co-operation with several research laboratories. Each copy (ca. 50 pages) contains 300–400 abstracts in Czech or Slovakian. Abbreviation in *For. Abstr.*: *Prehl. lesn. Lit.*

5. ***Derevopererabatyvajuščaja i Lesohimičeskaja Promyšlennostj.*** Goslesbumizdat, Moskva. Monthly. Price *Roubles* 5 per copy. P.R.
A monthly technical journal published since Jan. 1952 under the aegis of the Ministry of Paper and Wood-Processing Industries of the U.S.S.R. Each issue contains ca. 32 pp. Abbreviation in *For. Abstr.*: *Derev. lesohim. Prom.*

6. ***Opera Collecta.*** Centrum voor Bosbiologie in de Limburgse Kempen, Bokrijk-Genk.
Volume 1, 1953, with 117 pp., consists of reprints from *Agricultura, Louvain* (*Ser.* 2) Vol. 1, 1953. Articles are in French or Flemish, with French, Flemish, English and German summaries. Citation in *For. Abstr.*: *Opera Collecta Cent. Bosbiol. Limburgse Kempen.*

7. ***Canadian Journal of Biochemistry and Physiology.*** National Research Council, Ottawa. 2-monthly. Price $3·00 p.a. O.R.S.
Previously *Canadian Journal of Medical Sciences.* Vol. 32, No. 1, under the new title was issued in Jan., 1954. Abbreviation in *For. Abstr.*: *Canad. J. Biochem. Physiol.*

0 (084.3/4). MAPS AND ATLASES

See also Nos. 35, 1296.

8. URRIES Y AZARA, J. J. DE. Mapa forestal de la provincia de Lérida. **[Forest map of the province of Lerida.]** Instituto Forestal de Investigaciones y Experiencias, Madrid. 1954. 8 sheets. Scale: 1: 100,000.
Showing the distribution of the various forest types.

9. URRIES Y AZARA, J. J. DE. Memoria adjunta al mapa forestal de la provincia de Lérida. **[Report accompanying the forest map of the province of Lerida.]** Instituto Forestal de Investigaciones y Experiencias, Madrid. 1954. pp. 140 + 32 plates + 6 maps. [Span.]
This profusely illustrated report is in 2 parts. Part I deals with the geography, climate, geology, topography, hydrology, biotic influences, climatic zones and natural regions of the province. Part II consists of descriptions of the forest types.

0 - - 011. TERMINOLOGY. NOMENCLATURE

See also Nos. 136, 141, 269, 311–2, 501–2, 527, 826.

10. COUDREAU, J. Sur la nécessité de normaliser la terminologie utilisée en matière de foresterie tropicale avec quelques indications sur la façon dont il semblerait bon d'envisager cette étude. **[The necessity for standardization in tropical forestry terminology with suggestions for a possibly useful approach.]** [*Proc.*] 1*st. Conf. for. interafric., Abidjan 1951,* 1952 (551–62). 5 refs. [F.e.]
The author instances the varied connotations of such terms as 'forest' and 'savanna' in both English and French, emphasizes the disservice done thereby to tropical forestry, and suggests principles for standardization.

0 - - 015. MATHEMATICS. STATISTICAL METHODS

See Nos. 326, 460, 751.

11. SITE FACTORS: CLIMATE, SITUATION, SOIL, HYDROLOGY (WATER AND SOIL CONSERVATION)

11. Écologie descriptive. 1. Techniques et méthodes. **[Descriptive ecology. 1. Techniques and methods.]** [*Pap.*] *8th int. bot. Congr. Paris, Sect.* 7 1954 (135–59). [E.F.] X.
In this section is included a series of papers on instruments and methods of assessing climatic and edaphic factors.

111. *The Atmosphere. Meteorology. Climate and Microclimate*

111.1. Composition, Structure, Mechanics and Thermodynamics of the Atmosphere in General

12. SILVA, Q. G. PINTO DA. **Pollen contents of the air in Lisbon.** [*Pap.*] *8th int. bot. Congr., Paris, Sect.* 6 1954 (281). X.
[Cf. *For. Abstr.* 15 (No. 5).] Results of a further census taken from Feb. 1952 until the end of Aug. 1953.

111.2. Radiation and Temperature

See also Nos. 21, 268.

13. KØIE, M. E. **A self-recording light integrator and a portable integrator for light-percentage measurements.** *Oikos* 4 (2), 1952/53 [1954] (178–86). 10 refs. [E.]
Describes a photometer designed particularly for measurement of relative illumination in woodland or other sites where uneven distribution of light necessitates the use of an integrating instrument with a sensitivity proportional to the intensity, but it can also be used for measuring light intensity. The photometer, developed at Copenhagen University, measures 15 × 21 × 25 cm. and weighs 4·5 kg.

14. SHIPMAN, R. D. **Simple aid to instantaneous measurement of light intensity.** *J. For.* 52 (8), 1954 (605–6). 8 refs.
Describes and illustrates a simple, inexpensive, home-made holding device for a photo-electric cell for use in measuring relative illumination in the forest.

15. AALTONEN, V. T. **Earth radiation in the light of forest investigations.** *Commun. Inst. for. Fenn.* 40 (15), 1952. pp. 47. [E.fi.]
Cf. *For. Abstr.* 13 (No. 3559).

111.5. Wind

See Nos. 50, 477–80.

111.7. Humidity, Evaporation. Precipitation

See also Nos. 21, 50–4, 480, 603.

16. SCHMIDT, F. H., and FERGUSON, J. H. A. **Rainfall types based on wet and dry period ratios for Indonesia with Western New Guinea.** *Verhandelingen, Djawatan Meteorologi dan Geofisik, Djakarta* No. 42, 1951 (1952). pp. 77 + 3 maps. 7 refs. [E.]
On the basis of data for at least 10 years between 1921 and 1940 from some 2,500 rainfall stations and using Mohr's precipitation limits, maps have been constructed showing the division of Indonesia and W. New Guinea into regions with the Q numbers $\left(\frac{\text{average number of dry months}}{\text{average number of wet months}} \times 100\right)$, 0, 14·3, 33·3, 60, 100, 167, 300 and 700%. The accuracy of the data naturally varies with the number of rainfall stations, being high in e.g. Java, Madura, Bali, and Lombok and low in the lesser Sunda islands and W. New Guinea.

17. CRAMER, O. P. **A critical look at cloud seeding.** *J. For.* 52 (7), 1954 (515–7). 15 refs.
Three methods of assessing the effects of cloud seeding are described and a fourth, eliminating some of the serious limitations of these, suggested.

18. DAVIES, D. A. **Experiments on artificial stimulation of rain in East Africa.** *Nature, Lond.* 174 (4423), 1954 (256–8). 7 refs.

19. WETTERER, C. S. **Rainfall stimulation for forest fire prevention and control.** *Pulp Paper Mag. Can.* 55 (7), 1954 (166 . . . 173). (*Woodl. Sect Index Canad. Pulp. Pap. Ass.* No. 1375 (*F*–3).)
Discusses rainfall stimulation in general and its use in increasing amounts of rainfall and helping to control a forest fire in 1953 near Forestville, Quebec.

20. ATWATER, M. M., and KOZIOL, F. C. **Avalanche handbook.** Forest Service, U.S. Department of Agriculture, Washington. 1953. pp. 146. 21 refs.
Replaces an earlier and smaller publication. [Cf. *For. Abstr.* 12 (No. 2604).]

111.8. Climatology. Climate and Microclimate

See also Nos. 9, 268, 300, 435, 477–80, 1289, 1294.

21. KAUTTU, K. Havaintoja valaistuksen, ilman lämpötilan ja suhteellisen kosteuden vaihteluista eräässä kuusikossa. **[Observations on the variations in illumination, air temperature and relative humidity in a Spruce stand.]** *Commun. Inst. for. Fenn.* 40 (31), 1952. pp. 21. 17 refs. [Fi.g.]
Studies were made of vertical variation in microclimate in an even-aged, 75-year-old Norway Spruce stand on a good *Vaccinium*-type site at an altitude of 135 m. The results are set out in tables with German as well as Finnish legends.

22. HILDRETH, A. C. **Climatic factors affecting tree growth on the high plains.** *Arborist's News, Wooster* 18 (12), 1953 (105–14). L.S.
Discusses the effect on tree growth of low winter temperatures, aridity, low air humidity, light, and soils on the high plains of Colorado.

114. *Soil. Soil Science*

See also No. 254.

114.1. Soil Physics

See also Nos. 53–4, 381.

23. Olson, D. F., Jr., and Hoover, M. D. **Methods of soil moisture determination under field conditions.** *Sta. Pap. Stheast. For. Exp. Sta.* No. 38, 1954. pp. 28. 35 refs.

Classifies methods of determination as: gravimetric, electrical, tensiometric, and laboratory calibration of units, and compares their value.

24. Hoover, M. D., Olson, D. F., Jr., and Metz, L. J. **Soil sampling for pore space and percolation.** *Sta. Pap. Stheast. For. Exp. Sta.* No. 42, 1954. pp. 28. 3 refs.

Describes, with illustrations, methods and equipment developed at the Piedmont Research Center for collecting soil samples and determining percolation rate and pore space in the laboratory.

25. Viro, P. J. Kivisyyden määrittämisestä. [**On the determination of stoniness.**] *Commun. Inst. for. Fenn.* 40 (3), 1952. pp. 23. 6 refs. [Fi.e.]

Describes and discusses a method of testing the stoniness of a soil by measuring the mean penetration of a rod 1 cm. in diameter. The method is most suitable for testing a surface soil layer ca. 30 cm. deep—it is not suited to very thin or very thick layers. [Cf. *For. Abstr.* 11 (No. 3413).]

114.2. Soil Chemistry

See also Nos. 38–40, 212–4, 283, 325, 353, 381.

26. Iberg, R. Beitrag zur Kenntnis von Tonmineralien einiger schweizerischer Böden. [**The clay minerals of some Swiss soils.**] *Mitt. schweiz. Anst. forstl. Versuchsw.* 30, 1954 (62–132 + 2 plates). 270 refs. [G.g.f.]

27. Small, J. **Modern aspects of pH, with special reference to plants and soils.** Baillière, Tindall and Cox, London. 1954. pp. ix + 247. 15 pp. of refs. Price 20*s*.

28. Ferrell, W. K., and Olson, D. S. **Preliminary studies on the effect of fire on forest soils in the Western White Pine region of Idaho.** *Res. Note For. Exp. Sta. Idaho* No. 4, 1952. pp. 5 + 2 tbls. 2 refs.

The organic layer is shallow in these forests, but much organic matter and some mineral nutrients are destroyed when fires overrun the forest floor. Burning had little effect on infiltration. Chemical analysis showed that pH is consistently higher on burned than on unburned soils. N % was higher in 6 cases and lower in 3; available P was higher in 5 and lower in 3.

29. Viro, P. J. **Loss of nutrients and the natural nutrient balance of the soil in Finland.** *Repr.* from *Commun. Inst. for. Fenn.* 42 (1), 1953 (1–51). 60 refs. [E.fi.]

This investigation was carried out on the 5 largest river systems of Finland, representing 59·3% of the whole area of the country. Samples for river-water analysis were taken in every river just below the lowest hydro-electric plant, once a month for a period of 12 months. Samples for rain-water analyses were generally taken from the interior of the country, from places where there were no factories or settled areas in the vicinity.

When the proportion of clay-soil fields and the content of inorganic matter in river water were examined, a distinct correlation was found between them for the river basins of South Finland. The correlation applied to all inorganic components, indicating that the bulk of the inorganic matter in the water originates from the clay soil. In North Finland this correlation was not found, but this is because the clay soils are mostly uncultivated; good correlation exists between the total % of clay soils and organic-matter content of river water. Study of the % composition of inorganic matter in river water showed correlations with the composition of bedrock. It seems probable that the soils of the river basin govern the quantity, and the rocks the quality, of the solids in the water. Content of organic matter did not differ much from month to month, in spite of large variations in precipitation and discharge. The variation in contents of inorganic matter was appreciably greater, but this seems to be mainly due to the variation in the contents of SiO_2 and sesquioxides in suspension; the monthly variations in other individual substances were slighter, e.g. the mean error of the mean Ca content was at most 7%.

Results of analyses of rain water and snow are given and discussed (figures are given in kg./sq. km. for the sake of comparison with the figures for river water). River water contained more Si and Ca, rain water more Cl, SO_4 and Na; other %'s were about equal. The organic matter of river water contained 0·37% P and 2·47% N; the corresponding figures for rain water were 0·31 and 21·4%. The total solids carried into the soil from precipitation are calculated, and compared with amounts calculated to be lost by leaching, and a nutrient balance of the soil in Finland deduced from the results. The results indicate that in general there is a net loss, except in the case of N (amount received more than 3 times that lost), Na (loss and gain about equal), Cl (probably the same as N). The excess of N is utilized by the vegetation, and for forest soils, especially, the bound N thus carried into the soil may be very important. Possibly the excess of Cl is evaporated from the acid soil. It is estimated that since the end of the last glacial period, 3·3 cm. of soil have been lost by erosion, and that the soil is thus gradually losing its fertility. But this process is so slow in Finland that the fertility of the soil may be considered to be stable over very long periods.

30. Beadle, N. C. W., and Tchan, Y. T. **Nitrogen economy in semi-arid soils of Australia.** [*Pap.*] *8th int. Bot. Congr. Paris, Sect. 7* 1954 (218–21). X.

In the semi-arid regions of New South Wales, 5 widespread and distinctive plant communities are found. Three of these reach a height of 5–6 m. (1) The *Acacia aneura* alliance, (2) the *Casuarina*/*Heterodendron* alliance, and (3) the *Eucalyptus oleosa*/*E. dumosa* alliance. The other 2 communities are dominated by members of the Chenopodiaceae.

Sources of N in these 5 communities were investigated, a study stimulated by the widespread death of *A. aneura* and the resultant decline in soil N. No definite conclusions were reached. Legumes do not appear to play a leading rôle in N fixation. Fixed N brought down by rainfall must be of some significance. Widespread occurrence of phototrophic organisms suggest that they play some part in N economy. Non-symbiotic organisms are of no more than local importance. Chief loss of soil N is through wind erosion.

114.3. Soil Formation. The Soil Profile and its Development. Litter, Humus etc.

See also Nos. 29, 46–7, 214–5, 254, 353.

31. GABBRIELLI, A. Su alcuni terreni da conglomerati della Val di Pesa. **[Some forest soils of the pliocene conglomerates of the Val di Pesa (Florence).]** *Ital. for. mont.* 9 (3), 1954 (161–7). 10 refs. [It.it.f.]

A study was made of 3 undisturbed soil profiles, one (*a*) under Oak and two (*b*) and (*c*) under Pine. In the case of (*a*) the acidity characteristic of these soils has been reduced by the litter, and in (*b*) and (*c*) increased. This acidity favours the movement of Fe and Al sesquioxides to the lower horizons, and there is evidence of early stages of podzolization.

32. METZ, L. J. **Forest floor in the Piedmont region of South Carolina.** *Proc. Soil Sci. Soc. Amer.* 18 (3), 1954 (335–8). 8 refs. O.R.E.

Annual litter fall, weight of forest floor, and organic-matter incorporation in the surface foot of mineral soil are reported for 3 Pine, 3 Pine/hardwood and 3 hardwood stands in the South Carolina Piedmont. The forest floors are classified as to humus type, and practical applications to forest management are discussed. *From author's summary.*

114.4. Soil Classification. Soil Types

See also Nos. 209, 215, 280, 298, 300, 1294.

33. KIZAKI, T., and WATANABE, T. **[Soils of the Daigo National Forest. Soils of the Yozuko National Forest. Soils of the Tokyo National Forest.]** In *Forest Soils of Japan, Report 4*, Government Forest Experiment Station, Meguro, Tokyo. 1954. pp. 1–86. 15 refs. [Jap.e.]

Cf. *For. Abstr.* 15 (Nos. 23–6).

34. HAYASHI, S., and SHIMOIDE, A. **[Soils of the Yogawa National Forest.]** In *Forest Soils of Japan, Report 4*, Government Forest Experiment Station, Meguro, Tokyo. 1954. pp. 87–116 + 18 photos. 10 refs. [Jap.e.]

35. **[Forest soils of Japan. Report 4. Soil maps. Daigo, Yozuku, Tokyo 4, 5, 6), Yogawa (Nagano 2).]** Government Forest Experiment Station, Meguro, Tokyo. 1954. 6 maps. [Jap.]

Contains 6 soil maps, scale 1 : 20,000, illustrating papers on the forest soils of the 4 districts. [Cf. preceding abstracts.]

36. EDWARDS, M. V. **Laterite in Burma.** *Burmese For.* 3 (2), 1953 (64–6). [E.]

Notes on the distribution and vegetation of lateritic soils.

37. HEIKURAINEN, L., and HUIKARI, O. Turvelajin mikroskooppinen määrittäminen. **[The microscopic determination of peat types.]** *Commun. Inst. for. Fenn.* 40 (5), 1952. pp. 34. 21 refs. [Fi.e.]

114.5. Soil Fertility. Soil Toxicity. Soil Depletion and Exhaustion

See also Nos. 15, 29, 46, 254, 276, 285, 298, 325, 531, 758–60.

38. VLAMIS, J., STONE, E. C., and YOUNG, C. L. **Nutrient status of brushland soils in southern California.** *Soil Sci.* 78 (1), 1954 (51–5). 9 refs.

Soils from 'chaparral' in southern California were assayed for N, P and K by means of a modified Mitscherlich pot-testing technique. N and P deficiencies were found, particularly in the second horizons. Only one soil showed a K deficiency.

39. VIRO, P. J. **Nutrient status and fertility of forest soil. I. Pine stands.** *Commun. Inst. for. Fenn.* 39 (4), 1951 (1952). pp. 54. 115 refs. [E.fi.]

The present study indicates that, in the conditions of southern Finland, CaO is the most important nutrient in morainic soils and MgO in glacio-fluvial soils. The moisture conditions of Finnish morainic soils are very much alike, the ground moraine being usually impermeable to water. Probably owing to this general availability of water, more importance attaches to the effect of nutrients in improving the fertility of morainic soils, and it is concluded that fertility of such soils for Pine can be determined by chemical soil analysis. On glacio-fluvial soils, on the other hand, moisture conditions vary greatly between different stands, and water is often a limiting factor to growth. At least partly on this account, the correlation between nutrient content and fertility is lower on glacio-fluvial soils. Much of this report is taken up with a comparison of different methods of determining the content of different nutrients in the soil.

40. KIENER, P. Contribución al estudio de los suelos de la Guayana venezolana. **[A study of soils of the Guayana region of Venezuela.]** *Bol. Ingen. for. Univ. Los Andes* 1 (3), 1954 (5–12). 16 refs. [Span.]

Presents the results of analyses of soil samples from the region of the R. Caroní, drawing the conclusion that such soils are primarily suited to forest and not agriculture.

41. OKAZAKI, A. **On the significance of the solute ratio of seedlings as an indicator to judge the site quality.** [*Pap.*] *8th int. bot. Congr. Paris, Sect. 13*, 1954 (91–2). X.

Comparisons of the ratio of solute in the cell sap to dry matter in plants from different sites provide a useful means of assessing site quality.

42. SAMEK, V. K ekologii rychle rostoucích dřevin. **[The ecology of fast-growing trees.]** *Lesn. Práce* 33 (6), 1954 (249–53). [Cz.]

Discusses the possibilities of fast growth of Poplars in different plant communities of the grasslands of Bohemia and Moravia. *Alnetum glutinosae* and *Franguleto-Alnetum* do not as a rule, present favourable conditions. In *Saliceto-Populetum*, the optimum proportion of Poplars can vary from 0·1 to

1·0, depending on the type of undergrowth. In *Querceto-Ulmetum* it can be 0·1–0·5.

114.6. Soil Biology

See also Nos. 30, 212, 216–30, 353.

43. **Experimental ecology. Session 8: antibiotic factors in soil and peat.** *Proc. 7th int. bot. Congr. Stockholm 1950*, 1953 (254–8). [E. or F.]

Includes papers (with discussion) by: *P. W. Brain, P. J. Curtis* and *E. G. Jefferys* on antibiotics produced by fungi in acid heath soils [cf. *For. Abstr.* 12 (No. 2611)]; *E. Grossbard* on the production of antibiotic substances in the soil; *D. Pramer* and *R. L. Starkey* on streptomycin in the soil; *J. L. Ramaut* on the rôle of *Sphagnum recurvum* in the acidity of peat bogs.

44. WRIGHT, J. M. **The production of antibiotics in soil. I. Production of gliotoxin by *Trichoderma viride*.** *Ann. appl. Biol.* 41 (2), 1954 (280–9). 20 refs. O.R.E.

A study of conditions affecting the production of gliotoxin in 2 types of soil. [Cf. *For. Abstr.* 12 (No. 2611).]

45. BOHNSACK, K. K. **A study of the forest floor arthropods of an Oak-Hickory wood in Southern Michigan.** *Abstr. of thesis*, in *Dissert. Abstr.* 14 (7), 1954 (1114). [University of Michigan.] O.R.S.

46. HOLSTENER-JØRGENSEN, H. Forskellige løvarters virkning på den biologiske aktivitet i rødgranhumus. **[The effect of leaves of various species upon the biological activity of Norway Spruce humus.]** *Dansk Skovforen. Tidsskr.* 38 (7), 1953 (509–18). 7 refs. [Dan.]

Describes a preliminary experiment, using Richard's method of determining biological activity [cf. *For. Abstr.* 8 (No. 59)], in a Norway Spruce stand in Jægerborg Hegn, Denmark. The humus was a good, fine mor, with transitions to surface mull in places. No ground vegetation was present. Replicated plots 25 cm. square were treated in Nov. 1951 with 3 different weights of foliage from each of a variety of herbaceous and deciduous tree species, taken from the plants at about the middle of the leaf-fall period, dried to constant weight at 60° C. and weighed into the necessary portions in that condition. Besides the control series of plots, one series was limed at 3 different rates. The protein and cellulose threads were placed in position on 12–14 May, 1952, along the mid-line of each plot, between the humus layer and the mineral soil. They were removed for tensile tests on 15–17 July and 30 Sept.–1 Oct., 1952. Results are shown in a table and graph. The cellulose was already very markedly decomposed at the former date and gave considerable dispersion of values. The protein gave more consistent results especially for the individual plots, but since the area was not uniform, there was considerable dispersion of values for different plots and the results can only be regarded as indicative. So far as they go, they show that biological activity was higher in the first period, and enable the treatments to be divided into two main groups: (1) favourable—CaO, *Impatiens* sp., *Mercurialis perennis*, *Rhamnus frangula*, *Sambucus nigra*, *Ulmus* sp., *Betula* sp., *Oxalis acetosella*, *Urtica dioica*; (2) less favourable—*Vaccinium myrtillus*, *Rubus idaeus*, *Fraxinus excelsior*, *Corylus avellana*, *Quercus robur* s.l., *Acer pseudoplatanus*, *Fagus sylvatica*, controls, *Alnus glutinosa*. The order, however, is more or less uncertain owing to the site differences, which are accounted for, at least in part, by the root distribution of the Spruce trees. It is noted that in general the effect of the leaves, and of lime, increased with increasing dosage. Visual estimates of degree of decomposition were also made in the field. By 12 Dec., 1951, *Oxalis* (1 g.) and *Impatiens*, *Urtica* and *Sambucus* (2 g.) leaves had disappeared. On 23 May, 1952, *Urtica*, *Mercurialis*, *Oxalis*, *Impatiens* and *Sambucus* (2, 4 and 8 g.) had all practically gone (only petioles and thick midribs or nerves remaining). For the remaining species decomposition decreased in the order: *Rhamnus*, *Ulmus*, *Fraxinus*, *Rubus* (all much decomposed); *Corylus*, *Alnus*, *Acer* (less decomposed); and *Quercus*, *Betula*, *Vaccinium* and *Fagus* (feeblest decomposition). This order remained unchanged up to 30 Sept., 1952.

47. BORNEBUSCH, C. H. [Edited by HOLSTENER-JØRGENSEN, H.] Laboratorieforsøg til belysning af regnormenes biologi. **[Laboratory experiments on the biology of earthworms.]** *Dansk Skovforen. Tidsskr.* 38 (9), 1953 (557–79). 6 refs. [Dan.]

Summarizes notes by C. H. Bornebusch on some experiments interrupted by his death. (1) Feeding experiments: In one series *Lumbricus terrestris* proved a very active leaf-eater, preferring leaves of species characteristic of good mull soils; *Allobophora turgida* appeared to be exclusively a feeder on humus; and *Dendrobaena octaedra* in this experiment also fed only on humus, though some field observations suggest that it is too early to generalize on its behaviour. Several other species were included but results were inadequate for conclusions. In another series, with the object of discovering the relative preference for leaves of different plant species, using chiefly *L. terrestris*, the following order of descending preference was found: (i) *Mercurialis perennis*, *Urtica dioica*, *Oxalis acetosella*, *Agrostis* sp., *Sambucus nigra*; (ii) *Crataegus* sp., *Alnus glutinosa*, *Ulmus* sp., *Fraxinus excelsior*, *Prunus padus*, *Corylus avellana*, *Betula* sp., *Acer pseudoplatanus*, *Carpinus betulus*, *Ribes* sp.; (iii) *Prunus serotina*, *Fagus sylvatica*, *Quercus robur* s.l., *Q. borealis*; (iv) *Abies alba*, *Pseudotsuga taxifolia*; (v) *Pinus mugo*, *P. sylvestris*, *P. nigra* var. *austriaca*; (vi) *Picea abies*, *Larix decidua*, *L. leptolepis*. To some extent, except for group (i), the order of preference was that given within the groups, though no exact order should be inferred. [The editor includes a note on several experiments of his own, using undetermined (sexually immature) worms of which most were probably *L. terrestris* and *Allobophora chlorotica*, where the disappearance of leaf matter was determined by weighing the leaf residues at intervals and re-exposing them to attack between weighings. The descending order of preference found was *Sambucus*, *Fraxinus* and *Rhamnus frangula*, *Mercurialis*, *Betula*, *Ulmus*, *Acer pseudoplatanus*, *Alnus glutinosa*, *Prunus serotina* and *Quercus*, *Fagus*.] (2) A further series concerned the physical working of the soil by worms, studied in narrow rectangular glass vessels kept in

the dark until required for examination or photographing. *Lumbricus terrestris* (+ *L. festivus* in one test) again proved an active leaf-eater but wandered little in the soil, making only a few burrows running more or less vertically, which became lined with mull. On the other hand, it covered the surface ½ cm. deep with its casts. *Allobophora longa* was a fairly active leaf-eater: it burrowed a great deal, leaving a fine network of burrows especially in the mull. Mineral soil was transported into the mull and leaf layers, and burrows in the mineral-soil layer were quickly lined with mull. *A. turgida* again proved a humus feeder: it burrowed in the mull and introduced some mineral soil from the underlying layer, living chiefly in the horizons adjacent to the mineral soil, in which its short burrows became lined with mull. As regards depth of working it appears that the species can be roughly divided into deep (*Lumbricus* spp. and *A. longa*) and shallow workers, but no quantitative data can be given.

48. Ronde, G. Vorkommen, Häufigkeit und Arten von Regenwürmern in verschiedenen Waldböden und unter verschiedenen Bestockungen. 5. Untersuchungen im tertiären Hügelland am Donaumoos. 6. Die Regenwurmbesiedlung eines Waldstandortes im jahreszeitlichen Verlauf. [**Occurrence, population densities and species of earthworms in different forest soils under different cover types. 5. Investigations on Tertiary uplands in the Donau Moos. 6. Worm populations of a forest site in the course of the seasons.**] *Forstwiss. Cbl.* 73 (3/4), 1954 (113–26). 10 refs. [G.]

[Cf. *For. Abstr.* 15 (No. 1052).] (5) Studies were made on (*a*) Tertiary plains, (*b*) Tertiary uplands, and (*c*) dunes. Sandy and infertile soils are unfavourable to earthworms, especially under Pine. Other conifers and deciduous species offer favourable environments, especially Oak, Beech, Lime, Hornbeam and Red Oak. The cover type outweighs the influence of all other ecological factors, including groundwater level. (6) Populations and their activity fluctuate according to the season, and vary with site.

116. *Hydrology. Soil and Water Conservation and Erosion*

See also Nos. 29, 83, 444–5, 447–51, 471, 480, 489, 576, 1321.

49. Chapline, W. R. **Observations on the forest, range, and watershed situations in Greece.** FAO, Rome. No. *FAO*/54/6/3183, 1954. pp. 9.

Notes on a tour.

50. **Studies on fog-prevention forest (Volume III).** *Bull. For. Exp. Sta., Meguro, Tokyo* No. 64, 1953. pp. 276. Many refs. [Jap.e.]

The bulletin comprises 33 papers, most of which have English summaries, on fog and the use of forests in intercepting sea fog. There are 3 sections: meteorological, physical, and agricultural and forest. Many of the papers are concerned with data on occurrence of fog in Japan, the causes of fog and its dispersal, and techniques of measuring fog, atmospheric turbulence, and moisture content. Papers of more definitely forestry interest include: The diminution of fog density to the lee of a planted forest (*T. Kashiyama, K. Takahashi* and *K. Kitamura*: pp. 44–45); The rise in ground temperature to the lee of a forest (*K. Takeda* and *S. Motoki*: pp. 57–62); Measurement of atmospheric turbulence in the neighbourhood of a forest (*T. Ishida, T. Kobayashi* and *H. Imai*: pp. 89–96); The capture of fog particles by the forest (*H. Oura*: pp. 113–22); The effect of windbreaks in reducing wind and intercepting fog in 'fog-damage-prevention forests' at Ohta, Akkeshi (*T. Mishima, S. Onodera, H. Masuda,* and *M. Ishikawa*: pp. 133–65); Wind movements in forest areas (*M. Ishikawa*: pp. 166–9); Light in forests with openings in the canopy on foggy days (*Y. Harada*: pp. 171–81); Phytosociological study on forests in districts influenced by sea-fog (*M. Tatekawi, M. Nakano* and *H. Yamamoto*: pp. 182–227); and The composition and growth of forests in foggy districts (*Z. Matsui*: pp. 228–69). [Cf. *For. Abstr.* 15 (No. 2239).]

51. Trimble, G. R., and Weitzman, S. **Effect of a hardwood forest canopy on rainfall intensities.** *Trans. Amer. geophys. Union* 35 (2), 1954 (226–34). 17 refs. H.S.B.

The area studied was a fully stocked, even-aged, mixed hardwood stand about 50 years old in the Fernow Experimental Forest, near Parsons, W. Virginia. Rainfall intensities and the amount of storm rainfall in the open were compared with intensities and throughfall (i.e. amount of precipitation reaching the earth, not including stem-flow) under a canopy. Low rainfall intensities are reduced more by a summer canopy and high rainfall intensities more by a winter canopy. Throughfall is reduced by canopy interception about equally in both summer and winter. The physical presence of a forest cover, therefore, seems to have only a limited value in reducing the erosion potential of the rainfall as it strikes the forest floor.

52. Pereira, H. C. **The physical importance of forest cover in the East African highlands.** *E. Afr. agric. J.* 19 (4), 1954 (233–6). 22 refs.

Reviews recent investigations in Africa, America, and England, and concludes that for a tropical country like E. Africa, dependent on very limited catchments, the evidence is already sufficient to challenge any large-scale conversion from forest to arable. Forest cover is the most effective in flood control and presents cooler condensation surfaces than bare ground or grassland to moisture-laden air rising against them. The planting of fast growing softwoods with annual coupes, leaving most of the canopy closed, is the best land use in the small and vital catchments of E. Africa for the safe improvement of stream flow. By clear felling, clearing, immediate replanting and clean-weeding until the canopy is closed, the maximum interruption of transpiration is economically achieved. The deep-rooted grasses (*Cynodon* spp., *Pennisetum clandestinum*) and the Alpine Bamboo (*Arundinaria alpina*) are inferior to Cypress plantations as water-savers, and even for streamside vegetation it remains to be proved which transpires the more, herbs or woody plants. In cloud forest, it has been shown elsewhere that the transpiration stream may be completely

reversed by condensation on the foliage, a phenomenon that may explain in the forest type on the Shimba hills, which have an annual rainfall of 45 in. though the species suggest 80. [Cf. *For. Abstr.* 15 (No. 3216).]

53. BETHLAHMY, N. **Estimating summer evapotranspiration losses in a Pennsylvania Scrub Oak forest.** *Repr.* from *Proc. Soil Sci. Soc. Amer.* 17 (3), 1953 (295–7).

Changes in soil moisture were studied by placing fibreglass units to a depth of 2 ft. in different soils under Scrub Oak (*Quercus ilicifolia*) in Pennsylvania. The differences in storage from day to day when the soil was below field capacity were measured to give the daily evapo-transpiration losses. These were then examined in relationship to certain climatic and soil factors. A direct relationship was found between atmospheric saturation deficit and evapotranspiration losses. Other climatic elements bore no relation to such losses, which began at a minimum saturation deficit of ca. 0·020 in. of mercury. It was discovered that the value of the saturation deficit regression coefficient was directly related to the total sand content in the soil profile. Thus, for areas with a similar vegetation it should be possible to determine the evapo-transpiration regression equation by making a mechanical analysis of the underlying soil.

54. KITTREDGE, J. **The influence of shade and litter of Pine on evaporation from a clay loam soil at Berkeley, California.** *Ecology* 35 (3), 1954 (397–405). 19 refs.

Measurements were made under a 40-year plantation of *Pinus canariensis*, ca. 45 ft. high with 85% crown cover and no undergrowth, and on natural grassland. The following are some of the conclusions reached. (1) Under the Pines, evaporation from the upper foot of soil for March–Aug. was $\frac{8}{9}$, and for Sept.–Feb. $1\frac{1}{4}$ times that in the open. (2) The corresponding fractions for a free water surface were $\frac{1}{3}$ and $\frac{1}{2}$. The influence of the forest was much less on evaporation from soil than from water. (3) Rates of evaporation from the upper foot of soil were $\frac{1}{2}$–$\frac{1}{4}$ of those from free water surfaces. (4) Ca. 80% of the evaporation from the upper 20 in. of soil came from the upper 12 in. in both cases; ca. 50% came from the upper 4 in. in the open and from the upper 6 in. under the forest. (5) Daily evaporation decreased as soil moisture decreased, according to the equation $E = aM^b$, in which a and b varied with depth and also between forest and open.

55. KITTREDGE, J. **Influences of Pine and grass on surface runoff and erosion.** *J. Soil Wat. Conserv.* 9 (4), 1954 (179–85, 193). 10 refs. [University of California, Berkeley, Calif.]

A comparison of surface run-off and erosion from undisturbed grassland and from a dense plantation (20 years old in 1931) of *Pinus canariensis* in California, over a period of 13 years (1931–46), indicated marked differences in the surface run-off and close similarity in the small amounts of erosion. Surface run-off from the Pine litter, probably in the form of downhill movement of water along the fallen needles, began after as little as 0·5 in. of rain, but from grassland only after 3–12 in. Total seasonal surface run-off, however, averaged 3·79 in. from the grassland and only 0·61 in. in the Pine, representing respectively 15·8 and 2·0% of the seasonal precipitation. Seasonal erosion from both types of cover averaged less than 0·1 metric ton/acre. [Cf. *For. Abstr.* 3 (p. 105).]

56. PRICE, H. R. **Improvement in infiltration after nine years of hardwood forest management.** *J. For.* 52 (6), 1954 (449–50). 2 refs.

Gives a table of forest-land infiltration classes, F–1 to F–4 (excellent to poor), based on canopy, litter depth, fire, grazing, depth of A_1 horizon, total soil depth, slope and exposure. Improvements are ascribed to the first 4 factors as the only ones alterable in a short period. A second table gives the % area distribution of each of these classes for 1941 and 1950 in the following zones in the Ivy River catchment, Upper French River basin, Tennessee: (*a*) national forest, where fire protection is effective, grazing excluded and selective felling practised, (*b*) large blocks in private hands where woodland grazing is general, and (*c*) small scattered farm woodlands, better fenced and fire protected than (*b*). Taking classes F–1 and F–2 together, (*a*) (*b*) and (*c*) and the whole catchment increased the areas of these classes by 49, 5, 24 and 20% respectively.

57. **[A study of the June flood (1953) in Kyushu.]** *Bull. For. Exp. Sta., Meguro, Tokyo* No. 69, 1954. pp. 402. [Jap.e.]

Contains papers by different authors on meteorology, geology, soils, flood water, erosion control, silviculture and forest management, and economics, in relation to the heavy floods in the Aso and Moji districts. The sections on silviculture (by *K. Sakaguchi* and *Y. Hayashi*) contain recommendations on plans prepared for silvicultural control of flooding in the two districts.

58. ELLISON, L., and COALDRAKE, J. E. **Soil mantle movement in relation to forest clearing in southeastern Queensland.** *Ecology* 35 (3), 1954 (380–8). 4 refs.

Examination of steep slopes on which landslides occur showed that mantle movement is normally rapid under rain forest and that there is no evidence to show that landslides occur more frequently on areas cleared of forest and put down to grass.

59. VELEZ, I. **Soil conservation practices in the Caribbean Islands.** [*Pap.*] *8th int. bot. Congr. Paris, Sect. 25* 1954 (154–5). X.

Rational agricultural practices on the islands of St. Thomas, St. Vincent and Montserrat.

14. SYSTEMATIC ZOOLOGY

See also No. 133.

145.7. Insecta. Entomology

See also Nos. 671 *et seq.*, 1136 *et seq.*

60. WEIDNER, H. Fortschritte auf dem Gebiet der angewandten Termitenkunde. **[Progress in applied termitology.]** *Z. PflKrankh.* 61 (7), 1954 (337–51). 116 refs. [G.g.e.] E.M.B.

A review of literature on general problems; systematics; nutrition of termites and its economic importance; protection and control; and the termite problem in S. Africa, Europe and the Mediterranean, Indonesia, the Seychelles, Australia, and N. and S. America.

61. NEGI, P. S. **Dimorphism in lac insects.** *Indian For.* 80 (8), 1954 (423–6). 6 refs.
Cf. *For. Abstr.* 15 (No. 49).

62. BORATYNSKI, K. L. ***Matsucoccus pini* (Green 1925) (Homoptera, Coccoidea: Margarodidae) bionomics and external anatomy with reference to the variability of some taxonomic characters.** *Transactions of the Royal Entomological Society of London* 103 (9), 1952 (285–326 + 4 sets of drawings). 32 refs. O.R.S.

63. BRIMBLECOMBE, A. R. **Studies of the Coccoidea. 1. New species of *Neoleonardia*.** *Qd. J. agric. Sci.* 10 (3), 1953 (161–6). 5 refs. O.R.E.
Descriptions of *N. chitinosa* and *N. aliformis* found on Eucalypts in Queensland.

64. BUCK, H. Untersuchungen und Beobachtungen über den Lebensablauf und das Verhalten des Trichterwicklers *Deporaus betulae* L. **[Research and observations on the life history and behaviour of *D. betulae*.]** *Zoologische Jahrbücher (Abteilung für allgemeine Zoologie und Physiologie der Tiere), Jena* 63 (2), 1952 (153–236). 22 refs. [G.g.] O.R.S.
An account of laboratory studies.

65. BRIMBLECOMBE, A. R. **An annotated list of the Scolytidae occurring in Australia.** *Qd. J. agric. Sci.* 10 (3), 1953 (167–205). 17 refs. O.R.E.

66. KŘÍSTEK, J. Kontrola vývojového stavu pilatky pruhované (*Pachynematus scutellatus* Htg.). **[Checking the developmental stage of *P. scutellatus*.]** *Lesn. Práce* 33 (3), 1954 (114–9). [Cz.]
Gives some details of the life, habits and morphology of larvae and pupae.

67. GYÖRFI, J. Megfigyelések a gyilkosfürkészdarazsak (Braconidae, Hymenoptera) életéből. **[Observations on the habits of Braconidae.]** *Erdömérnöki Föiskola Évkönyve Sopron 1951/52, Budapest* 1953 (77–92). 24 refs. [Hung.russ.e.]

68. BLANCHARD, E. E. Sinópsis de los Agromízidos argentinos. (Diptera, Agromyzidae). **[Synopsis of the Argentine Agromyzidae.]** [*Publ.*] *Inst. Sanid. veg. Argent.* (*Ser. A*) 10 (56), 1954. pp. 48. 30 refs.

69. BLANCHARD, E. E. Contribución al conocimiento de los Oestromuscarios entomófagos argentinos. I. Los Belvosiinas (Dipt. Exoristidae). **[The entomophagous Oestromuscoid flies of Argentina. I. Belvosiinae.]** [*Publ.*] *Inst. Sanid. veg. Argent.* (*Ser. A*) 10 (57), 1954. pp. 53. 14 refs. [Span.]
Descriptions of these flies, which could be usefully employed in the control of fruit and forest tree pests. Some new genera and species are described.

15. ANIMAL ECOLOGY. GAME AND FISH MANAGEMENT, HUNTING, SHOOTING AND FISHING

See also Nos. 482, 665 *et seq.*, 1289, 1293.

70. MORRISS, D. J. **Correlation of wild life management with other uses on the Pisgah National Forest.** *J. For.* 52 (6), 1954 (419–22).
Notes on the management of a forest for the combined provision of water, timber, meat (deer, grouse, fish) and recreation.

71. LAWRENCE, W. H. **Michigan beaver populations as influenced by fire and logging.** *Abstr. of thesis*, in *Dissert. Abstr.* 14 (7), 1954 (1011–2). [University of Michigan.] O.R.S.
The major results of the study are: (1) The present peak in the Michigan beaver population, largely the result of fires following Pine logging, is part of a historical sequence in which peaks have always followed widespread disturbances that destroy the forest. (2) Beavers are primarily a part of the biocoenosis in the temporary Aspen type, which, in the normal forest succession, is replaced by more tolerant species after a single generation. Forest fire suppression, silvicultural practices and tree-felling by the beavers are aiding rapid replacement of Aspen along streams. The peak in beaver numbers can persist only as long as Aspen remains available within 5 chains of the water. (3) If beaver management is to succeed, favourable stages in forest succession must be maintained in appropriate quantities. Management should be integrated into a forest management programme similar in pattern to the natural Aspen/conifer cycle and should be on a streamwise basis with some streams producing beavers and others recovering from beaver occupation.

16. GENERAL BOTANY

72. **Proceedings of the 7th International Botanical Congress, Stockholm 1950.** Chronica Botanica Co., Waltham, Mass., U.S.A., 1953. pp. 899 + 20 plates.
Most of the papers of forestry interest have already been covered in *Forestry Abstracts* (Vol. 12 onwards) from pre-prints and abstracts made available at the conference, or from subsequent publication in journals. Some of the more important sessions are dealt with in the present issue of *For. Abstr.*

160. *Plant Chemistry*

See also Nos. 27, 41, 43–4, 78, 131–2, 494, 915 *et seq.*, 1233 *et seq.*

73. WHITE, D. P. **Variation in the nitrogen, phosphorus and potassium contents of Pine needles with season, crown position and sample treatment.** *Proc. Soil Sci. Soc. Amer.* 18 (3), 1954 (326–30). 15 refs. O.R.E.
Plantations in New York were sampled and analysed in order to obtain data on these variations and to provide a basis for standardizing the sampling routine in collecting Pine needles for foliar analyses. Previous observations were confirmed, on the decline in % of N, P and K in needle tissue from an

early summer maximum to a fairly constant base level during the winter months. Late autumn and winter sampling is recommended, since at this time needles are least likely to be affected by physiological changes, and are more expressive of soil-fertility levels and species norms. Mid-crown positions are recommended; aspect is not considered important. Needles must be stripped from the branches and oven-dried (70° C.) immediately. Air drying may cause important dry-weight losses in tissue with resultant increases in nutrient %. *From author's summary.*

74. KONDO, T., and FURUZAWA, N. **[A few chemical components of leaves of *Cryptomeria japonica*. Relation between [flavonoid and glucose] contents and the season.]** *J. Jap. For. Soc.* 36 (7), 1954 (190–3). 10 refs. [Jap.e.]

Chromatographic analysis showed: (1) a maximum flavonoid (quercimeritrin) content in July–August; (2) a maximum glucose content in December–January. [Results are shown in tables and graphs with English legends.]

75. GUSEVA, A. R. Vydelenie hlorogenovoĭ kisloty iz listjev èvkommii i ee opredelenie. **[Isolation of chlorogenic acid from *Eucommia* leaves, and its [quantitative] determination.]** *Dokl. Akad. Nauk SSSR* 94 (6), 1954 (1137–9). 8 refs. [Russ.] A.P.B.

The leaves analysed contained ca. 3% of this acid. Methods of isolation and quantitative determination are described.

76. PLOUVIER, V. Sur la composition hétérosidique de quelques *Fraxinus* (Oléacées). **[The heterosides of some *Fraxinus* spp.]** *C.R. Acad. Sci., Paris* 238 (18), 1954 (1835–7). 2 refs. [F.f.] O.R.S.

In an examination of 26 *Fraxinus* spp., syringoxide was isolated from 11 in the sub-section *Melioides*, 2 in the sub-section *Sciadanthus* and from *F. chinensis* and *F. excelsior*. The fluorescent heterosides were lacking in the *Melioides* sub-section. Coniferoside was isolated from *F. quadrangulata* and mannitol from all the species.

77. CHAUDHRY, G. R., SHARMA, V. N., and DHAR, M. L. **Chemical examination of the roots of *Caesalpinia digyna* Rottler.** *J. sci. indust. Res., India* 13*B* (2), 1954 (147–8). 6 refs. D.S.I.R.

Provisional results of examination of 'Vakerin', a crystalline phenolic substance isolated from air-dried powdered roots (yield 3% by weight).

161. *Physiology*

See also Nos. 52–3, 199 *et seq.*, 408–9, 418, 492–4, 588, 617, 620, 646–8, 861, 874.

78. PARKER, J. **Physiological differences in conifer leaves of different ages.** [*Pap.*] *8th int. bot. Congr. Paris, Sect. 11* 1954 (284–5). [E.] X.

A study of respiration, frost- and drought-resistance and chemical composition.

79. GRAHAM, B. F., JR. **A technique for introducing radioactive isotopes into tree stems.** *Ecology* 35 (3), 1954 (415). 2 refs. [Duke University, Durham, N.C.]

The isotope solution is adjusted to the desired pH and so diluted that the required amount of activity per application is contained in each ml. Each 1-ml. unit is then placed in a shell vial 25 mm. long with a 12-mm. outside diam. The vials are stoppered with No. 3 corks, which are barely small enough to fit them. The diam. of the larger end of these corks is 14 mm. At the desired point on the tree trunk or branch a 13-mm. ($\frac{1}{2}$-in.) hole is bored, with a slight upward slant towards the centre of the stem, to a depth of 50 mm. One of the prepared vials is placed in the hole and its cork seated firmly. Then a dissecting needle, fixed securely in a hand vice, is forced through the centre of the cork, and the vial is pushed off the cork inside the tree. By holding the cork in place with a screwdriver, the needle can be withdrawn. The cork and its surrounding area are immediately covered with a sealing substance. The advantages of this technique are that handling of exposed radioactive isotopes can be done in the laboratory; applications of uniform volume are facilitated; the upward slant of the hole causes the isotope to be concentrated in the region of the phloem, cambium and sapwood, whence it is most readily translocated; suberization is kept to a minimum since no part of the hole has time to become dry; and the basic technique is easily adaptable to situations requiring the introduction of larger or smaller volumes of material.

80. FERRELL, W. K., and HUBERT, E. E. **The use of radioisotopes in forest tree research.** *Idaho For.* 34, 1952 (42–5).

In studying pole blight of White Pine [*Pinus monticola*] in Idaho, it was found that P and Ca had peculiar distributions in diseased trees—the P being found higher and the Ca lower than normal. Radioactive substances (Ca or P or both) were injected into the trunk at a height of ca. 3 ft., the foliage was sampled at different heights, and radioactivity determined with a Geiger counter to determine the rate at which they travelled. Analysis of the data showed that P accumulates in increasing amounts as one goes up the tree. This large initial accumulation high in the tree is at variance with the known distribution of total P in the tree, so it is concluded that there must be considerable re-circulation of P. Since elements in the xylem stream are probably deposited in largest amounts where transpiration is most intense, the data indicate that the transpiration rate is probably highest in the upper crown of the tree. It was found that radioactive isotopes move more rapidly in pole-blighted than in healthy trees, which is attributed to the greater amount of transpiration in the diseased trees.

Another method of recording the movements of radioactive isotopes in trees is to photograph the radiations emanating from tissues injected with these tracers. Six Pines [some healthy and some diseased] which had been injected with radioactive Ca and P were felled, and cross-sections of the trunk cut 3 ft. below, and 5, 15, 25, 45, and 65 ft. above, the point of injection. The cross-sections were planed, coated with tinfoil, and placed in contact with radio-sensitive film. The films, when developed, showed a lessening of radioactivity in all trees from the ground to a point including the 45 ft. section. The 65 ft. section, near the top of the trees, containing a large proportion of sapwood, showed an increase in

radiation. In all cases radiation ended at the junction of sapwood and heartwood, indicating no apparent translocation into the heartwood tissue. In general, the radiation in the phloem and bark of diseased trees was not as uniformly distributed as, and was more intensive than in the healthy trees. When autoradiographs were prepared from microtome sections (ca. 25μ thick) cut from cross-sections, a greater difference in radiation between diseased and healthy trees was observed.

A note is given on projected greenhouse experiments in the use of radioactive tracers on potted seedlings inoculated with *Leptographium* sp. or *Armillaria mellea*.

81. Gilbert, S. G., Drosdoff, M., and Sell, H. M. **Differential absorption by Tung seedlings of potassium from some of its salts.** *Soil Sci.* 78 (3), 1954 (219–24). 12 refs.

Describes a study to determine whether the absorption of K is influenced by the nature of the anion with which the K forms a salt. During 30 days pot-grown *Aleurites* seedlings received K and also N in solution as cations of some one anion. In this way the relative rates of K absorption were assessed from salts of the following anions: chloride, nitrate, sulphate, tartrate and pectate. The data obtained show that the K of the monovalent salts was accumulated in the leaves of Tung plants at a significantly higher rate than was that of the polyvalent salts. *From authors' summary.*

82. Ivanov, L. A. O sosuščem apparate kornja drevesnyh porod Sovetskogo Sojuza. **[The absorbing apparatus of the roots of [some] tree species in the U.S.S.R.]** *Dokl. Akad. Nauk SSSR* 93 (4), 1953 (713–6). 6 refs. [Russ.] A.P.B.

In rough estimation of the absorbing portion of roots, the mere presence or absence of root hairs is not a reliable criterion, but it is possible by inspection of fresh material under the microscope to recognize tissues capable of absorption by their external appearance, cutting sections only for doubtful cases. This technique was used on 1- to 4-year seedlings [number not stated] from a nursery in Leningrad. Results (diameter, length, area of absorbing portion per root-tip, number of root-tips and total area of absorbing root per plant) are tabulated for *Picea abies*, *Pinus sylvestris*, *Quercus robur*, *Q. borealis*, *Tilia parvifolia*, *Betula verrucosa*, *Ulmus* sp., *Acer platanoides*, *Fraxinus mandshurica* and *F. excelsior*. The diameter of the absorbing portion was small, 0·1–0·3 mm., in all species; its length per root-tip varied from ca. $\leqslant$ 1 mm. in Spruce and Pine to 2–3 mm. in Elm and Maple and 18–19 mm. in the Ashes. The total absorbing root area per seedling (in sq. mm.) divided by total leaf area in sq. cm. is tabulated for all but two of the species (mean values for 8 seedlings of each), 1-year seedlings falling into 3 clear groups: (*a*) Spruce, Pine and Pedunculate Oak—1–8. (*b*) Elm and Maple—64–73. (*c*) Birch, Lime and Common Ash—182–238. This order agrees with their grouping in previous studies of transpiration: low for (*a*), moderate for (*b*) and high for (*c*). So far as results for older seedlings go, they show a decrease in the absorbing-root/leaf-area ratio. The area of root hairs is not included in the figures given, as in the conditions of this study they were well developed only in group (*c*).

83. Ivanov, L. A., Silina, A. A., and Celjniker, Ju. L. O transpiracii polezaščitnyh polos v uslovijah Derkuljskoĭ stepi. **[Transpiration of shelterbelts in the conditions of the Derkul' steppe.]** *Bot. Ž.* 38 (2), 1953 (167–84). 14 refs. [Russ.] C.G.B.

[Cf. *For. Abstr.* 15 (No. 2260).] Results of investigations in 1951 confirmed the previously found considerable decrease of transpiration (even for conifers) in conditions of insufficient moisture. The degree of this decrease varies with the species. In localities within the steppe characterized by a higher water table, the transpiration of all species increases, attaining levels observed near Moscow. The linear transpiration/temperature relationship observed by the authors there, is found in the Derkul' steppe only for some species and in places with a higher water table. Artificial watering rapidly increases the transpiration and its correlation coefficient with temperature. Closing of stomata and water retention in leaves are prominent in the mechanism of the reduction of transpiration. Xeromorphism and wilting do not seem to play any role in the conditions observed. The harmful effect of hot dry winds is due primarily to overheating of the leaf tissues, and not to the wind current or air dryness. Tissues so killed lose water rapidly, whereas artificial heating of leaves up to 44° C. reduced transpiration and increased the amount of water retained by the leaves. The transpiration per hectare of a 14-year-old pure Oak and mixed Oak/Ash stand for a period of 4 months (mid-May to mid-Sept.) varied from 135 to 148 mm. The amount of transpiration of each species in the Derkul' steppe varies largely with the composition of stands; thus, the transpiration of Oak in an Oak/Ash stand was more than doubled when the *Caragana arborescens* undergrowth was removed.

84. Polster, H. Die Anwelkmethode Arlands im Blickfelde der Transpirationsphysiologie. (Kritischer Beitrag mit eigenen Versuchen an Forstgewächsen). **[Arland's wilting method against the background of transpiration physiology. (A critical contribution with special tests on forest plants.)]** *Arch. Forstw.* 2 (4/5), 1953 (384–425). 55 refs. [G.g.]

Arland's proposition is that the 'relative transpiration' (weight of water transpired per 100 g. fresh weight as determined by his own wilting method) provides a quantitative criterion of growth conditions. Plants in favourable conditions, as indicated by vigorous growth; use water economically and resist drought efficiently. Any unfavourable treatment will cause a rise in the 'relative transpiration' of the plant. The relationship between treatment, transpiration, and yield was tested by Arland on agricultural crops, using this rapid technique which is essentially the measurement of the plants' ability to withstand the unfavourable moisture conditions applied in the test. Under laboratory conditions, the method involves pot cultures under uniform conditions of sowing, soil, soil moisture, air humidity, temperature and light. After some weeks of growth and after a night of specially controlled conditions favourable for normal transpiration, the

plants are lifted with balls of earth and weighed, the protruding root ends being then cut and sealed with paraffin wax. The plants are then left to transpire with their roots thus cut off from the water supply of the soil for periods varying with the species (wheat ½ hr.) and weighed again. The method is applicable to special treatments in the field also but owing to lack of control of the factors mentioned, to wind speed, and to ignorance of the water balance and water deficit, results are not so clear as under controlled conditions. Arland arranged his field trials under the most exact conditions and weighed these plants on the mornings of wind-free, warm, dry and cloudy days. Treatments included soil nutrient and moisture requirements, soil types, climatic and external factors, the effects of fungal attack and of spraying and dusting, size of seed, depth, time and density of sowing, cultural measures and comparisons of selected seed. The author describes his own trials with 6 species or hybrids of Poplar (cuttings with 6–8 leaves, transpiration 1–1½ hr. with natural soils and N, P and K); Red Oak (5-leaf seedlings, 3 weeks in pots, 3-hr. transpiration/unit leaf area, one natural soil at various levels of soil moisture); Pines and Douglas Fir (2-year seedlings, 6 weeks in pots, ½, 1, 1½ and 3 hr. transpiration/leaf weight with 4 natural soils); Lupins as standard indicators (1-year seedlings, 1 hr. transpiration/fresh weight in mineral and humus soils at various levels of acidity, moisture and fertilizers). Results with the Poplars were obscured by little understood factors and some contradicted Arland's proposition. *P. trichocarpa*, a very accommodating species, showed, however, a decided preference for one soil type. *P. robusta* responded exactly in soil nutrient trials, the 'relative transpiration' rising with excessive applications. Red Oak was confirmed to be more tolerant of drier soils than indigenous species. The relative transpirations of Douglas Fir and Pine bear out in outstanding fashion their soil preferences. Differences in the known requirements of two species of Lupin were also substantiated. The author concludes that for nursery stock the method has a direct application but that the preceding physiological conditions require further working out since, for nearly all applications, the 'relative transpiration' depends on these conditions. The present position of transpiration physiology is reviewed in an introduction.

85. PRESTON, R. D. **The transpiration of plants.** *Repr.* from *Proceedings of the Leeds Philosophical and Literary Society* (*Scientific Section*) 6 (3), 1954 (154–67). 26 refs. P.R.

A review with a selected list of references, mostly recent.

86. SCHMIDT, W. Physiologische Teste im Keimlingsalter. **[Physiological tests of plants in the seedling stage.]** [*Pap.*] *8th int. bot. Congr. Paris, Sect. 13* 1954 (29–30). [G.f.] X.

A method of testing respiration intensity in seedlings has been evolved by the author, from which it was found that *Pinus sylvestris* seedlings from colder regions have a higher respiratory rate than those from warmer climates. This is probably the reason why production of timber is less in trees of northern than in those of southern provenance. The test should prove useful in determining the provenance of seed.

87. CHAPMAN, V. J. **Respiration in Mangrove seedlings in relation to environment.** [*Pap.*] *8th int. bot. Congr. Paris, Sect. 7* 1954 (206–7). X.

88. TRANQUILLINI, W. Die Lichtabhängigkeit der Assimilation von Sonnen- und Schattenblättern einer Buche unter ökologischen Bedingungen. **[The light-dependence of the assimilation capacity of sun- and shade-leaves of a Beech under ecological conditions.]** [*Pap.*] *8th int. bot. Congr. Paris, Sect. 13* 1954 (100–2). [G.] X.

Measurements on a Beech tree in Munich showed that shade leaves receiving the lowest light intensities on the tree by far surpass the sun leaves in their assimilation potential. In the region of 500–1000 luxes their production capacity per g. of dry matter is 4–5 times that of the sun leaves. [Cf. *For. Abstr.* 14 (No. 65).]

89. GUNDERSEN, K. **Chlorophyll in young shoots of European Beech (*Fagus sylvatica*) in winter.** *Nature, Lond.* 174 (4419), 1954 (87–8). 2 refs.

90. SAX, K. **The control of tree growth by phloem blocks.** *J. Arnold Arbor.* 35 (3), 1954 (251–9). 15 refs.

By exposing stem segments to X-rays sufficient to suppress cell division, or by inverting a ring of bark, phloem blocks can be induced in trees without killing the stem tissues. The irradiation-induced phloem blocks seem to be caused by a failure of renewal in the phloem elements. The reversed polarity of the inverted bark-ring also prevents renewal of phloem elements. *From author's summary.*

91. Physiologie de la croissance. 1. Correlations de croissance. **[Physiology of growth. 1. Growth correlations.]** [*Pap.*] *8th int. bot. Congr. Paris, Sect. 11* 1954 (114–37). Many refs. [E. or F.] X.

The section contains, among others, the following papers: Auxin and ethylene in the regulation of abscission (*F. T. Addicott*); Growth substances and geotropism of roots (*H. Rufelt*); Growth-regulators and nutritional relations in the plant and their connection with development (*F. Lona*); The rôle of auxins in root genesis (*F. Nysterakis*).

92. ASAKAWA, S. **Growth substances. Preliminary studies on the growth inhibitors in *Fraxinus* fruits.** *J. Jap. For. Soc.* 36 (6), 1954 (153–9). 9 refs. [E.e. jap.]

Seeds of *F. spaethiana* from which the pericarps had been removed germinated more readily than those with the pericarp intact. Aqueous extracts of pericarps of *F. spaethiana* and *F. mandshurica* var. *japonica* reduced and delayed germination of turnip seeds. Water-soluble inhibitors were found in the seed as well as in the pericarp. Inhibitors in all extracts regulated root growth as well as germination. Extracts of seeds and pericarp of *F. sambucina* var. *pubescens*, *F. spaethiana*, *F. mandshurica* var. *japonica* and *F. excelsior* all had similar effects on the germination of turnip seed. The presence of growth-inhibiting substances, however, is not alone sufficient to explain the delayed germination of seeds of *F. mandschurica* var. *japonica*.

93. EWART, M. H., SIMINOVITCH, D., and BRIGGS, D. R. **Studies on the chemistry of the living bark of the Black Locust tree in relation to frost hardiness. VI. Amylase and phosphorylase systems of the bark tissues.** *Plant Physiol.* 28 (4), 1953 (629–44). 28 refs. O.R.E.

[Cf. *For. Abstr.* 15 (No. 2263).] The optimum temperature for the amylase system fell from 55° to 50° C. as the incubation period increased from 27 to 64 min. The products of starch hydrolysis by this amylase were maltose, glucose and dextrine. The synthesis of polysaccharide from glucose-1-phosphate by the phosphorylase was studied in detail, the optimum temperature for this reaction being ca. 50° at pH 6·6. Substances inhibiting the amylase and the phosphorylase are listed and their effect described. It is concluded that both systems in this species depend on the integrity of sulphydryl groups.

94. LARSEN, C. M. Du rapport entre le sexe et le développement chez les arbres dioïques. **[Relationship between sex and growth in dioecious trees.]** [*Pap.*] *8th int. bot. Congr. Paris, Sect. 13* 1954 (25–6). [F.] X.

Observations on hybrids of *Populus tremula* and *P. tremuloides* showed that height growth was greater in male trees.

95. LOHWAG, K. **Formation of fruiting bodies by wood-destroying higher fungi in pure cultures.** *Transl. Commonw. sci. industr. Res. Organ. Aust.* No. 2166, 1954. pp. 14 + 9 photos. 68 refs. Transl. by M. Slade from *Sydowia, Annales Mycologici, Ser. II, Horn* 6 (5/6), 1952 (323–35). [See *For. Abstr.* 15 (No. 2268).] Limited distribution. P.R.

163. *Embryology*

96. RAO, A. N. **Embryology of *Shorea talura* Roxb.** *Phytomorphology* 3 (4), 1953 (476–84). 3 refs. O.B.D.

97. HJELMQVIST, H. **The embryo sac development of *Quercus robur* L.** *Phytomorphology* 3 (4), 1953 (377–84). 15 refs. O.B.D.

98. BANERJI, I., and HAKIM, A. **A contribution to the life-history of *Artocarpus lakoocha* Roxb.** *Proc. Indian Acad. Sci.* 39*B* (3), 1954 (128–32). 5 refs. O.R.S.

Examines the floral morphology, anther and pollen development, ovule and megasporogenesis, and ♀ gametophyte. The number of haploid chromosomes was found to be 28.

164. *Morphology*

See also Nos. 82, 98, 152, 385–6, 844 *et seq.*

99. ALLEN, E. K., GREGORY, K. F., and ALLEN, O. N. **Origin and emergence of rootlets from nodules of *Caragana arborescens* Lam.** [*Pap.*] *8th int. bot. Congr. Paris, Sect. 21* 1954 (12–3). X.

100. FLORIN, R., and BOUTELJE, J. B. **External morphology and epidermal structure of leaves in the genus *Libocedrus*, sensu lato.** [*Pap.*] *8th int. bot. Congr., Paris, Sect. 4* 1954 (54–6). 2 refs. X.

101. WYLIE, R. B. **Leaf organization of some woody dicotyledons from New Zealand.** *Amer. J. Bot.* 41 (3), 1954 (186–91). 6 refs. O.B.D.

The results of leaf measurements on 38 species, representing 28 genera, from North Island.

102. LARSEN, C. M. Étude relative aux variations de la grandeur des stomates dans le genre *Populus*. **[Variations in the size of stomata in the genus *Populus*.]** [*Pap.*] *8th int. bot. Congr. Paris, Sect. 13* 1954 (26–7). [F.] X.

Presents the results of measurements made on 12 species and hybrids of the section Leuce. Each species has its own particular size of stomata; of those studied *Populus alba* and *P. grandidentata* had the smallest and *P. tremuloides* the largest stomata. Variations in size were greatest in *P. tremuloides*. Hybrids showed sizes intermediate between those of their parents, but the influence of the father was dominant.

103. **Paleobotany. Session 5: the female cones of conifers.** *Proc. 7th int. bot. Congr., Stockholm 1950*, 1953 (576–81). [E., F. or G.]

Papers (with discussion) by: *R. Florin* on the female reproductive organs of the stachyosperms; *H. Gaussen* on the evolution of the cone in the Coniferae; and *J. T. Buchholz* on the cones of certain rare conifers of the southern hemisphere.

104. SPORNE, K. R. **Nuclear endosperm and the problem of the primitive dicotyledon.** [*Pap.*] *8th int. bot. Congr. Paris, Sect 8* 1954 (251). X.

Suggests, on the basis of a correlation between nuclear endosperm and other floral and vegetative characters more abundant in fossil times than today, that nuclear endosperm is a primitive condition, which may be used in assessing the relative primitiveness of the dicotyledon families.

105. DEUTSCHMANN, F. Zur Mikroskopie von Tengkawang und deren Unterscheidung von echter Illipe. **[The microscopic study of Tengkawang and the distinction between Tengkawang and Illipe.]** *Angew. Bot.* 28 (1/2), 1954 (1–12). 7 refs. [G.g.] E.M.B.

A morphological and anatomical study of seeds of *Shorea stenoptera* (Tengkawang), often confused in commerce with those of *Illipe latifolia* and *I. longifolia*. Distinguishing characters of the 2 kinds of seed are described. Notes on the pericarp of other *Shorea* spp. are also included.

106. FERRÉ, Y. DE. La structure des plantules de conifères, son importance en phylogénie. **[The structure of conifer seedlings, its phylogenetic significance.]** [*Pap.*] *8th int. bot. Congr., Paris, Sect. 4* 1954 (78–80). [F.] X.

107. GILBERT, G., and LÉONARD, J. Importance des plantules pour la délimitation des genres. **[The importance of seedlings in distinguishing genera.]** [*Pap.*] *8th int. bot. Congr., Paris, Sect. 4* 1954 (49–50). [F.] X.

Data collected from Caesalpiniaceae and Mimosaceae in the Belgian Congo show that the seedlings of each genus have well-defined characteristics, which may be useful in solving taxonomic problems.

108. FELIUS, P. M., and DOORENBOS, J. De jeugdphase van houtige gewassen. **[The juvenile phase of woody plants.]** *Repr.* from *Vakblad voor*

Biologen 33 (11), 1953 (205–12). 22 refs. [Du.] E.M.B.

Discusses literature on the juvenile phase in general and in the Apple, and its shortening, with a brief section on its persistence in some conifers, particularly among the Cupressaceae.

165. *Phylogeny, Evolution. Heredity, Genetics and Breeding, Variation*

See also Nos. 86, 98, 143, 152, 200–2, 253, 356, 374 *et seq.*, 384, 413, 493, 623.

109. **Forest tree improvement issue.** *J. For.* 52 (9), 1954.

Contains the following, mainly relating to work in N. America: The scope of forest genetics (*S. S. Pauley*; pp. 643–4); The importance of species hybridization and polyploidy in forest tree improvement (*J. W. Duffield*; pp. 645–6); Extensive application of genetics by the silviculturist (*C. M. Kaufman*; pp. 647–8); Selection in the intensive phase of forest tree improvement (*B. Zobel*; pp. 649–50); Opportunities in disease and insect control through genetics (*A. J. Riker*; pp. 651–2); The relation of geographic race to forest tree improvement (*P. C. Wakeley*; p. 653); Seed certification and forest genetics (*H. J. Baldwin*; pp. 654–5); Breeding for improved growth rate and timber quality in Western White Pine (*A. E. Squillace* and *R. T. Bingham*; pp. 656–61); Wood density and seed source in young plantation Red Pine (*L. W. Rees* and *R. M. Brown*; pp. 662–5); Controlled pollination of Pine species in N. America [comprehensive account of technique and equipment; 16 references] (*T. O. Perry*; pp. 666–71); Loblolly Pine seed production areas; (*L. T. Easley*; pp. 672–3); Preliminary report on a study of races in Black Walnut (*J. W. Wright*; pp. 673–4); Top growth and root development of rooted White Pine cuttings (*R. F. Patton* and *A. J. Riker*; pp. 675–7); Propagation of Sugar Maple by vegetative cuttings (*S. Dunn* and *R. J. Townsend*; pp. 678–9); Notes: Briefs of forest tree improvement work in North America by region or organization—[accomplishments, current research and programmes in California, Canada, Lake States, Northern Rocky Mountain Region, the Pacific Northwest and by the Committee on Southern Forest Tree Improvement, the Forest Genetics Research Foundation, and the Institute of Paper Chemistry (various authors; pp. 681–93).]

110. **Forest botany. Session 3: forest genetics problems.** *Proc. 7th int. bot. Congr., Stockholm 1950*, 1953 (300–7). [E. or G.]

Papers (with discussion) by: *C. Syrach Larsen* on tree displays [cf. *For. Abstr.* 12 (No. 2679)]; *P. C. Nielsen* on controlled pollination in the genus *Fagus* [cf. *For. Abstr.* 12 (No. 2685)]; *H. Johnsson* on species hybrids in forest tree breeding; *C. L. Kiellander* on induced and natural polyploidy in *Picea abies* [cf. *For. Abstr.* 12 (No. 2695)]; *S. S. Pauley* on the work of the Cabot Foundation [cf. *For. Abstr.* 12 (No. 2571)]; *H. van Vloten* on tree diseases in relation to provenance; *A. F. von der Schulenburg* on provenance and pulpwood [cf. *For. Abstr.* 12 (No. 2692)]; *C. Heimburger* on breeding White Pine [cf. *For. Abstr.* 12 (No. 2681).].

111. **Genetics. Session 6: studies in the USSR on the nature of hybrid plants and related problems.** *Proc. 7th int. bot. Congr., Stockholm 1950*, 1953 (346–9). [E.]

Papers by: *I. E. Gluschenko* on hybridization of plants by means of grafting; *K. S. Suchow* on directed changeability of phytopathogenic viruses; *N. V. Turbin* on new experimental data on the nature of fertilization in plants; *V. N. Stoletov* on the nature of hybrid plants.

112. Bergman, F. Om skogsträdens sjukdomsresistens och dess utnyttjande inom skogsträdsförädling. **[The disease resistance of trees and its use in forest tree breeding.]** *Årsberätt. Fören. Växtförädl. Skogsträd 1953*, 1954 (70–98). 3 pp. of refs. [Sw.]

A review of European and American literature on the nature of resistance to disease, and on results of breeding to increase resistance in various species.

113. Mergen, M. **Improving the early growth of Longleaf Pine.** *Naval Stores Rev.* 64 (3), 1954 (12–3, 21).

In spite of the well known resistance to drought and other desirable characteristics of Longleaf Pine, many foresters are reluctant to plant this species, because of its susceptibility to brown-spot disease in the 'grass stage' and because of its frequently delayed growth. *Pinus sondereggeri* a natural hybrid of Longleaf and Loblolly Pine, has an initial height growth intermediate between that of its parents. Studies of its characteristics, experiments in controlled hybridization, and attempts at selective breeding of Longleaf Pine with rapid juvenile growth are now in progress at the Lake City Research Centre. A short report on preliminary work is presented.

114. Schönbach, H. Beobachtungen an Einzelstamm-Nachkommenschaften 'einheimischer' Douglasienbestände. (Zugleich ein Beitrag zur Frage der natürlichen Formenmannigfaltigkeit der Douglasie). **[Observations on the single-tree progeny of an 'acclimatized' stand of Douglas Fir. (With a note on natural variability in Douglas).]** *Arch. Forstw.* 2 (6), 1953 (502–31). 27 refs. [G.g.]

Traces from the records an accidental mass selection during nursery transplanting of two forms of the coastal green Douglas Fir (var. *viridis*) that are believed to have been set out in two separate stands in 1885 at Tharandt. The seed came most likely from British Columbia via trees planted in Scotland. Tree-to-row sowings from these two stands in 1948 have brought out the differing rates of growth, morphology and frost resistance of the two forms, paralleled by differences in the crown form, branching, needle colour, bark shedding and bark colour of the mother trees. These forms are (*a*) a slow growing, frost-hardy, short-needled, 'Silver Fir' seedling type considered to be recessive and (*b*) a faster growing Spruce-like seedling with spirally twisted apical needles, which continues growth into the early frosts and suffers damage thereby. The difference in rates of growth is not maintained and frost hardiness probably marches with disease (*Phaeocryptopus gaeumannii*) resistance and recovery. For continental climatic conditions

(*a*) is preferred and mass selection in the nursery is a likely means to quick results.

115. AHOLA, V. K. Mukurapuista. **[On gnarly trees.]** *Commun. Inst. for. Fenn.* 40 (18), 1952. pp. 10. [Fi.e.]

Gives details of distribution and dimensions of known examples of gnarled Pine (311) and Spruce (23) in state forests in Finland. There is some reason to believe that this condition is inherited, and it is urged that such trees should be preserved as seed trees, on account of the value of the burls for cabinet work etc.

116. HEIKINHEIMO, O. Kokemuksia visakoivun kasvatuksesta. **[Experiments in growing curly Birch.]** *Commun. Inst. for. Fenn.* 39 (5), 1951 (1952). pp. 26. 18 refs. [Fi.e.]

Experiments in growing curly-grained *Betula verrucosa* indicate that the use of open-pollinated seed is generally inadvisable, as it produces only ca. 50% curly-grained individuals and often only a part of these (sometimes as few as 50%) grow into trees, the rest remaining shrubs. Over-dense stands retard the development of curly grain, though they discourage a shrubby habit of growth. Repeated light thinnings are recommended. Curly-grained wood appears to be less susceptible to decay than normal wood, and green pruning may safely be done on branches up to 1 cm. in diameter. [Cf. *For. Abstr.* 13 (No. 1123).]

117. SCHULENBURG, A. F. v. D. Probleme um Provenienzfragen bei Vorwaldholzarten für die Neubewaldung von Ödlandsböden. **[The question of provenance in pioneer species for the afforestation of sterile soils.]** [*Pap.*] *8th int. bot. Congr. Paris, Sect. 13* 1954 (22–3). [G.f.] X.

Betula verrucosa from the North Sea coast developed a bushy and stunted growth habit when planted on dry sandy soil 100 km. south-east of Berlin, whereas replacements of local provenance grew normally and well.

118. JURKEVIČ, I. D. Ob osobennostjah rasprostranenija ranneĭ i pozdneĭ form duba cereščatogo po tipam lesa v BSSR. **[Peculiarities of the distribution of early- and late-flushing forms of *Quercus robur* according to forest types in the Belorussian S.S.R.]** *Dokl. Akad. Nauk SSSR* 95 (1), 1954 (183–5). 14 refs. [Russ.] A.P.B.

In S. and central Belorussia the occurrence of these forms in relation to topography and soil is the reverse of that in the forest-steppe zone, and the Belorussian and forest-steppe forms cannot be taken as identical. It is especially important to pay attention to these differences in collecting seed for plantations; seed from different forest regions and forest types should be segregated and used according to its origin.

119. WILKINSON, J. **The cytotaxonomy of some *Salix* species.** [*Pap.*] *8th int. bot. Congr. Paris, Sect. 9* 1954 (91–2). X.

120. SATO, Y., and MUTO, K. Über die Lebensdauer des Blütenstaubs von *Salix bakko* Kimura. **[The longevity of pollen of *S. bakko*.]** *Res. Bull. Exp. For. Hokkaido Univ.* 17 (1), 1954 (15–22). 11 refs. [G.g.jap.]

Pollen remained viable longest (up to a year) at temperatures below 0° C. The effect of Adsol on longevity is not clear. Pollen stored over Adsol and K_2S and over K_2S alone remained viable for long periods, varying with the temperature and the amount of K_2S. Storing in air-free glass tubes gave the best results. Results are tabulated.

121. VABRE, A. L'hybride *Tsugo-Picea hookeriana* et ses parents: étude des plantules. **[The hybrid *Tsugo-Picea hookeriana* and its parents: a study of the seedlings.]** *Trav. Lab. for. Toulouse* 1 (5), Art. 15, 1954. pp. 8. 3 refs. [F.]

Confirms that this (formerly known as *Tsuga hookeriana*) is a hybrid of *T. heterophylla* and *Picea sitchensis*. [Cf. *For. Abstr.* 12 (No. 959).]

122. BRADSHAW, A. D. **Man's influence on hybridisation in *Crataegus*.** [*Pap.*] *8th int. bot. Congr. Paris, Sect. 10* 1954 (217). X.

C. monogyna and *C. oxyacanthoides*, the 2 Hawthorn species of Britain, are adapted to very different habitats, but there seems no barrier to interbreeding and the resultant hybrids are quite fertile. The confused taxonomic status of these species is due to hybridization where they have come into contact through disturbance of the original vegetation.

123. MARCET, E. Aspe und Weisspappeln, waldbaulich und wirtschaftlich wichtige Baumarten der Zukunft. **[Aspen and White Poplars, species of silvicultural and industrial importance for the future.]** *Schweiz. Z. Forstw.* 105 (8), 1954 (425–50 + 9 photos). 53 refs. [G.f.]

Reviews European work on breeding, propagation and increment of *Populus tremula*, comparing it with other Poplars of the section *Leuce*, and gives some data on increment and yield from plots at Zurich.

124. ŠČEPOTJEV, F. L. Novye gibridnye formy osiny. **[New hybrid forms of Aspen.]** *Dokl. Akad. Nauk SSSR* 97 (1), 1954 (161–4). 2 refs. [Russ.] A.P.B.

In 1940, at Kharkov, *P. bolleana* ♂ was crossed (cut-branch technique) with *P. tremula* ♀; 80 seedlings were raised, of which 27 survived in 1946 after the neglect of the war years and occupation. These vary widely in morphological characters, and roughly half are pyramidal and half broad-crowned. Two typical forms are described in detail, with leaf photographs, as *P. sukatshewi* (pyramidal; 8·5 m. high and 11 cm. d.b.h. at 14 years old) and *P. wesjolo-bokowenkiensis* (broad-crowned; 10·2 m. high and 18 cm. d.b.h. at 14 years). Both are drought-resistant and can be propagated by suckers or root cuttings or by green cuttings treated with growth regulator, e.g. α-napthyl-acetic acid, in the cold frame.

125. MCCOMB, A. L., and HANSEN, N. J. **A naturally occurring Aspen-Poplar hybrid.** *J. For.* 52 (7), 1954 (528–9).

Cites map references in Iowa for 2 stands of *Populus alba* × *P. grandidentata* of good form, rapid growth and apparent disease resistance, for one of which a stand and stock table is given (800 trees and 3500 cu. ft./acre, 3–9 in. diam., 34–74 ft. with m.a.i. of 145 cu. ft. at 24 years, 3½ times that of Oak of same age.

168. *Histology*

See also Nos. 659, 844 *et seq.*

126. BALL, E. **Histological effects of absorbed radioisotopes upon the callus of *Sequoia sempervirens*.** *Bot. Gaz.* 114 (4), 1953 (353–63). 8 refs. O.B.D.

127. **Morphology. Session 3: meristems and differentiation of plant tissues.** *Proc. 7th int. bot. Congr., Stockholm 1950*, 1953 (356–61). [E.]

Includes papers (with discussion) by: *F. A. L. Clowes* on the root apical meristem of Beech [cf. *For. Abstr.* 12 (No. 2701); and *K. A. Chowdhury* and *K. N. Tandan* on meristems and differentiation of plant tissues with special references to trees. [Cf. *For. Abstr.* 12 (No. 243).]

128. BARKER, W. G. **A contribution to the concept of wound repair in woody stems.** *Canad. J. Bot.* 32 (3), 1954 (486–90 + 10 photos). 13 refs. O.R.S.

Four- or five-year-old suckers of *Tilia americana* were grown in culture in diffuse light and at room temperature. It was found that after wounding of the stem, those xylem ray cells closely associated with the cambial zone would unite in proliferating with other cells recently derived from the cambium. Ray cells remote from the cambium, although potentially meristematic, failed to divide. Parenchyma throughout the body of the secondary wood was found to proliferate whenever a mass of parenchyma considerably larger than a normal multiseriate ray was exposed.

17. SYSTEMATIC BOTANY

172.8. Eumycetes (True Fungi)

See also Nos. 95, 622 *et seq.*, 1113 *et seq.*

129. OVERHOLTS, L. O. **The Polyporaceae of the United States, Alaska and Canada.** University of Michigan Press, Ann Arbor; Oxford University Press, London. 1953. pp. xiv + 466 + 132 photos. 238 refs. Price $7·50. P.R.

130. GILBERTSON, R. L. ***Polyporus montagnei* and *Cyclomyces greenei*.** *Mycologia* 46 (2), 1954 (229–33). 17 refs. P.R.

Presents the results of a comparison of the morphological characters of typical representatives of both species, and of those with intermediate hymenial configuration. It appears that both fungi represent the extremes in variation of a single species, *Polyporus montagnei*, viz. var. *montagnei* and var. *greenei*.

174. *Spermatophyta, Seed-Plants in General. Floras and Check-Lists*

See also Nos. 256, 844–55.

131. SOSA, A. Rapport entre la composition chimique des végétaux et leur place en systématique. **[Relationship between the chemical composition of plants and their systematic position.]** [*Pap.*] *8th int. bot. Congr. Paris, Sect. 14* 1954 (17–25). [F.] X.

132. GIBBS, R. D. **Comparative chemistry as applied to taxonomy.** [*Pap.*] *8th int. Bot. Congr. Paris, Sect. 4* 1954 (45–6). X.

Presents some results obtained with the HCl/methanol reagent (25 c.c. conc. acid: 100 c.c. methyl alcohol) for catechol tannins, with the 50% H_2SO_4 test for syringin and other substances, and the Mäule test for lignins.

133. SMART, J., and TAYLOR, G. [Editors]. **Bibliography of key works for the identification of the British fauna and flora.** *Publication, The Systematics Association, London* No. 1 (2nd ed.) 1953. pp. xi + 126. Price 12*s.* 6*d.* P.R.

For 1st ed. see *For. Abstr.* 4 (p. 81). The botany section has been largely rewritten, that on wood anatomy omitted, and sections on the anatomy of the higher plants and on pollen identification added.

134. SANTAPAU, H., and RAIZADA, M. B. **Contribution to the flora of the Gir forest in Saurashtra.** *Indian For.* 80 (7), 1954 (379–89 + 3 plates).

135. HUTCHINSON, J., and DALZIEL, J. M. [Revised by KEAY, R. W. J.] **Flora of West Tropical Africa. Vol. 1, Part 1.** Crown Agents for Oversea Governments and Administrations, London. 2nd ed. (rev.) 1954. pp. viii+295. 67 refs. Price 25*s.*

Vol. 1, part 1 contains preliminaries, gymnosperms, chlamydosperms, and part of angiosperms (Annonaceae-Guttiferae).

136. WALKER, A. Les noms des végétaux chez les Gabonais. **[Plant names of Gabon.]** [*Pap.*] *8th int. bot. Congr. Paris, Sect. 15* 1954 (39–45). [F.] X.

137. EXELL, A. W., and MENDONÇA, F. A. Conspectus florae angolensis, elaborado pelo Instituto Botanico de Coimbra com a colaboração do Museu Britanico (British Museum) fundado por Dr. L. Wittnich Carrisso. Vol. II, Fasc. 1. Celastraceae-Connaraceae. **[Conspectus florae angolensis, prepared by the Botanical Institute of Coimbra with the collaboration of the British Museum, work initiated by Dr. L. Wittnich Carrisso. Vol. II, Fasc. 1. Celastraceae-Connaraceae.]** Junta de Investigações do Ultramar, Ministério do Ultramar, Lisbon. 1954. pp. xvi + 152. [Port.]

138. Flore du Congo Belge et du Ruanda-Urundi. Spermatophytes. Vol. V. Papilionaceae (deuxième partie). **[Flora of the Belgian Congo and Ruanda-Urundi. Spermatophytes. Vol. V. Papilionaceae (Part 2).]** *Publ. Inst. nat. Étude agron. Congo belge* 1954. pp. 377 + map.

139. PARDY, A. A. **Notes on indigenous trees and shrubs in Southern Rhodesia.** *Reprs.* from *Rhod. agric. J.* 51 (1; 3), 1954. Each pp. [1] + plates.

Albizzia rhodesica, Androstachys johnsonii, Combretum zeyheri, C. imberbe var. *petersii, Sterculia quinqueloba, Pseudocardia zambesiaca* and *Acacia nigrescens*.

140. MILLER, O. B. **Addenda and corrigenda to the woody plants of the Bechuanaland Protectorate.** *Journal of South African Botany, Kirstenbosch* 19 (4), 1953 (177–82).

Cf. *For. Abstr.* 14 (No. 1006).

141. FANSHAWE, D. B. **Akawaio Indian plant names.** *Carib. For.* 14 (3/4), 1953 (120–7).

The Akawaios at present inhabit the Pakaraima plateau in British Guiana west of Ayanganna on the upper Mazaruni River and its tributaries. A brief account is presented of the vegetation of this region with a list of native plant names and their scientific equivalents.

142. SLEUMER, H. Notas sobre la flora argentina II. **[Notes on the flora of Argentina. II.]** *Lilloa* 26, 1953 (161–75). [Span.g.] A.P.B.

Notes on (1) *Symplocos* spp., (2) some Simarubaceae, and (3) *Citronella* spp.

174.2/.7. Gymnosperms

See also Nos. 100, 103, 106, 108, 121, 196, 1243.

143. GREGUSS, P. Origine et évolution des Coniférophytes. **[Origin and evolution of the conifers.]** [*Pap.*] *8th int. bot. Congr., Paris, Sect. 5* 1954 (178–88). [F.] X.

144. CASSIE, V. D. **New Zealand conifers.** *J. Arnold Arbor.* 35 (3), 1954 (268–72 + plate). 32 refs.

Notes on the species with a bibliography and classification.

145. TACKLE, D., and CROSSLEY, D. I. **Lodgepole Pine bibliography.** *Res. Pap. Intermt. For. Range Exp. Sta.* No. 30, 1953. pp. 57.

The bibliography contains 442 references, mostly to American and Canadian literature, including some unpublished manuscripts and reports. It is arranged alphabetically under authors' names and has a subject index.

146. ST. JOHN, H., and KRAUSS, R. W. **The taxonomic position and the scientific name of the Big Tree known as *Sequoia gigantea*.** *Pacif. Sci.* 8 (3), 1954 (341–58). 34 refs. E.M.B.

Reviews the evidence for the validity of Buchholz's genus *Sequoiadendron* and concludes that this is a true genus. The botanical and nomenclatural history of the Californian Big Tree is reviewed at some length and the adoption of the name *Sequoiadendron giganteum* (syn. *Sequoia gigantea*) is recommended. The Redwood remains unchanged as *Sequoia sempervirens*. [Cf. *For. Abstr.* 7 (No. 140).]

175.2. Monocotyledons

147. HILDEBRAND, F. H. Aantekeningen over Javaanse bambu-soorten. **[Notes on Javanese Bamboo species.]** *Rapp. Bosbouwproefsta., Bogor* No. 66, 1954. pp. 52 + 3 dgms. + 4 photos. 15 refs. [Du.jav.e.]

Contains information on growth, flowering and fruiting, planting material, spacing, harvesting, and tending, diameter classes and assortments, and notes on the distribution, nomenclature and uses of 13 species in Java.

148. VAUGHAN, R. E., and WIEHE, P. O. **The genus *Pandanus* in the Mascarene Islands.** *J. Linn. Soc.* (*Bot.*) 55 (356), 1953 (1–33 + 4 plates). 39 refs. O.B.D.

Descriptions of the species with a key and notes on their ecology, morphology and phylogeny.

176.1. Dicotyledons

See also Nos. 101–2, 104–5, 107, 118–9, 122, 124–5, 329, 881.

149. MERRILL, E. D. **Miscellaneous Malaysian notes.** *J. Arnold Arbor.* 35 (2), 1954 (134–56 + 1 plate).

Critical taxonomic notes, including some new names and new combinations, and descriptions of some new tree species (*Laportea elliptica, Crudia cauliflora, Aglaia heterobotrys, Linociera pachyphylla* and *L. stenura*).

150. BLAKE, S. T. **Botanical contributions of the Northern Australia Regional Survey. II. Studies in miscellaneous Northern Australian plants.** *Aust. J. Bot.* 2 (1), 1954 (99–140 + 7 plates). O.B.D.

Includes descriptions of two new tree species: *Vavaea australiana* and *Horsfieldia australiana.*

151. MUKHERJEE, S. K. **Origin, distribution and phylogenetic affinity of the species of *Mangifera* L.** *J. Linn. Soc.* (*Bot.*) 55 (356), 1953 (65–83). 51 refs. O.B.D.

152. JENTYS-SZAFEROWA, J. Studia nad brzozą ojcowską (*Betula oycoviensis* Bess.). **[Studies on *B. oycoviensis*.]** *Repr.* from *Ochrona Przyrody, Kraków* 21, 1953 (34–57). 14 refs. [Pol.pol.e.]

Presents the results of biometric measurements of leaves of *B. oycoviensis*, an indigenous Polish species; a detailed Latin description is also given. [Cf. *For. Abstr.* 13 (No. 2803).]

153. SILLANS, R. *Tisserantodendron walkeri* Sillans, Bignoniacée nouvelle du Gabon. **[*T. walkeri* a new member of the Bignoniaceae from Gabon.]** *Bull. Soc. bot. France* 100 (7/9), 1953 (281–2). [F.] O.B.D.

Describes a new species of this genus, hitherto believed to be monospecific.

154. HUSSON, A. M., and LAM, H. J. **Revision of the Burseraceae of the Malaysian area in a wider sense. V. *Haplolobus*.** *Blumea* 7 (2), 1953 (413–58). 11 refs. [E.] O.R.S.

Discusses the characteristics of the genus, its distribution, relationships and ecology, and nomenclature, synonymy, types and material. Gives a key, and describes 21 species.

155. KALKMAN, C. **Revision of the Burseraceae of the Malaysian area in a wider sense. VI. Revision of the genus *Garuga* Roxburgh.** *Blumea* 7 (2), 1953 (459–72). [E.] O.R.S.

Discusses the distribution of the genus (with a map), gives a key to the species and describes as well as *G. floribunda*, the only species represented in the area, *G. forrestii* (W. China), *G. pierrei* (Yunnan, Thailand, Cambodia) and *G. pinnata* (S.E. Continental Asia).

156. GOMEZ, S. A. Caparidáceas argentinas. **[Argentine Capparidaceae.]** *Lilloa* 26, 1953 (279–341 + 1 plate). 40 refs. [Span.e.] A.P.B.

A systematic study of the Argentine species, with distribution maps.

157. EXELL, A. W. **Florae Malesianae precursores IV. New species of *Terminalia* from Malaysia.** *Blumea* 7 (2), 1953 (322–8). [E.]

[British Museum (Natural History), London.] O.R.S.

Describes 11 new species.

158. Vasconcellos, J. de Carvalho e, and Franco, J. do Amaral. Les chênes de Portugal. **[Portuguese Oaks.]** [*Pap.*] *8th int. bot. Congr., Paris, Sect. 4* 1954 (116). [F.] X.

Comments on past confusion in the identification of Portuguese Oaks and concludes that the native species are: *Quercus robur*, *Q. pyrenaica*, *Q. canariensis*, *Q. faginea*, *Q. lusitanica*, *Q. suber*, *Q. ilex* subsp. *rotundifolia* and *Q. coccifera*, plus their hybrids.

159. Nielsen, P. C. Rødegen i Nordamerika. **[Red Oak in N. America.]** *Dansk Skovforen. Tidsskr.* 38 (3), 1953 (225–302). 23 refs. [Dan.]

Notes from an extensive tour made by the author in Sept.–Nov. 1949 in the eastern U.S.A. to study *Quercus borealis* and to obtain seed for provenance trials in Denmark (the same provenances will also be tried in the Harvard Forest). The chief sections deal with the climate of the eastern U.S.A. compared with Denmark; impressions of the forest regions seen; the botany of the American Oaks with main reference to the Red Oaks; natural hybridization; a few statistics on Oak resources and uses of Oak in the U.S.A.; and some growth data.

160. Østergaard, J. ***Fagus orientalis* Lipsky.** *Dansk Skovforen. Tidsskr.* 38 (10), 1953 (605–13). 14 refs. [Dan.e.]

Brief notes on its nomenclature and native habitat, introduction into Germany, Denmark, Holland and Sweden, and trees in Denmark and their behaviour, with some remarks on morphological characters and phenology. In a Copenhagen park there exist 120 specimens planted in 1912; 10 of these, measured in 1952, averaged 18 m. in height and had a girth [b.h.?] of 1·2–1·4 m. Their first flowering was about 1945 and plants have been raised from seed gathered in 1950 and 1951. A single tree in the University Botanical Garden, Copenhagen, derived from seed sent from Tiflis and sown in 1906, was 12 m. high in 1952, with a girth of 0·94 m. In Jonstrup Vang, north of Copenhagen, there is a stand 0·1 ha. in area, planted in 1930 as 1- and 2-year-old seedlings. In 1953 the mean height was 10·8 m., diameter [b.h.?] 10–16 cm. and volume/ha. 105 cu.m. (number of trees equivalent to 2200/ha.). In these three places the species has proved frost-hardy.

161. Schaffalitzky de Muckadell, M., and Henriksen, H. A. *Fagus orientalis* Lipsky: en tilføjelse. [***F. orientalis*: an addendum.**] *Dansk Skovforen. Tidsskr.* 39 (1), 1954 (61–2). [Dan.]

In Dec. 1947 the Danish Forest Research Station measured one 0·3-ha. sample plot each in adjacent ca. 40-year plantations of *F. sylvatica* and *F. orientalis* at Oreby. The following figures refer to the species in that order: trees/ha. 877,634; height 16·8, 27·4 m.; diam. 17·6, 20·3 cm.; b.a./ha. 21·43, 20·66 sq. m.; volume/ha. 222, 220 cu.m.; b.a. increment/ha. (1942–47) 1·46, 1·44 sq. m. In this locality, in the severe 1947 winter, $\frac{1}{3}$–$\frac{1}{2}$ of the trees of *F. orientalis* developed longish necroses, attributed to frost damage, in the lowest 2–3 m. of the stems, and these are becoming covered with thick callus. *F. orientalis* appears to be faster growing than *F. sylvatica* only in youth but to be able to concentrate its increment upon fewer stems per unit area.

162. Steenis, C. G. G. J. van. **Additional note on *Nothofagus*.** *J. Arnold Arbor.* 35 (3), 1954 (266–7). 2 refs.

[Cf. *For. Abstr.* 15 (No. 1140).] *Trisyngyne* is declared a synonym of *Nothofagus* and the five species of *Trisyngyne* are transferred.

163. Sleumer, H. Flacourtiáceas argentinas. **[The Argentine Flacourtiaceae.]** *Lilloa* 26, 1953 (5–56). [Span.f.] A.P.B.

Descriptions of species, with a key.

164. Scott, R. A. **Status of an Asiatic member of the Juglandaceae regarded as a living fossil.** *Amer. J. Bot.* 40 (9), 1953 (666–9). 18 refs. O.B.D.

Discusses various opinions concerning the status of the Chinese and Indo-Chinese species assigned by Dr. Hsen-Hsu Hu to the fossil genus *Juglandicarya*, and concludes that there is no evidence that this is a closely related survivor of the extinct genus. Suggests that pending further studies the species should be referred to as *Carya sinensis*, the name originally assigned to it.

165. Burkart, A. El verdadero nombre botánico del 'guayacán': *Caesalpinia paraguariensis* (D. Parodi), nueva combinación. **[The true scientific name of Guayacán, *C. paraguariensis*, comb. nov.]** *Darwiniana, B. Aires* 10 (1), 1952 (25–30). [Span.] A.P.B.

Acacia paraguariensis of D. Parodi is synonymous with *Caesalpinia melanocarpa* of Grisebach. The new combination *C. paraguariensis* is presented.

166. Dwyer, J. D. **Further studies on the New World species of *Copaifera*.** *Bull. Torrey bot. Cl.* 81 (3), 1954 (179–87). 4 refs. O.B.D.

167. Pellegrin, F. Les 'gombé' du Cameroun. **[The 'Gombés' of the Cameroons.]** *Bull. Soc. bot. France* 100 (7/9), 1953 (266–7). [F.] O.B.D.

Two species are generally included under this name—*Didelotia africana*, and a new species, *D. letouzeyi*.

168. Léonard, J. Notulae systematicae, XIV. Les genres *Macrolobium* Schreb. et *Gilbertiodendron* J. Léonard en Afrique tropicale (Caesalpiniaceae). **[Notulae systematicae, XIV. The genera *Macrolobium* and *Gilbertiodendron* in tropical Africa.]** *Bull. Jard. bot. Brux.* 24 (1), 1954 (57–61). [F.] O.B.D.

169. Dumaz-le-Grand, N. Contribution à l'étude des Légumineuses de Madagascar. V. Trois espèces nouvelles de *Mundulea* (Papilionées). VI. Une espèce nouvelle de *Baudouinia* (Césalpiniées). **[The Leguminosae of Madagascar. V. Three new species of *Mundulea*.. VI. A new species of *Baudouinia*.]** *Bull. Soc. bot. France* 100 (7/9), 1953 (267–70). [F.] O.B.D.

Includes a description of a new species *B. suarezensis*, with a key to the species of *Baudouinia*.

170. Aristeguieta, L. Árboles de Venezuela, el Bucare. **[Trees of Venezuela, *Erythrina* spp.]**

Repr. from *Agric. venez.* 19 (167), 1954 (22–4). [Span.]

171. SILLANS, R. *Heimodendron* (Méliacées), genre nouveau du Centre africain. [***Heimodendron* (Meliaceae) a new genus from central Africa.**] *Bull. Soc. bot. France* 100 (7/9), 1953 (262–5). 16 refs. [F.] O.B.D.

The genus has affinities with *Carapa*, but differs from it in flower morphology, particularly in the disposition of anthers and petals. It is ranged under the sub-family Melioideae, and has one species, a small tree, *H. tisserantii*, found in the forests of the Upper Ubangi.

172. **Supplement to A Key to the Eucalypts (Blakely, 1934). (Covering species described, and changes in nomenclature, since 1934).** *Leafl. For. Timb. Bur. Aust.* No. 64, 1953. pp. 26. Many refs.

Reproduces verbatim the original descriptions of 35 new species and one re-description following collection of more adequate material. The leaflet also lists names wrongly used by Blakely and the corresponding valid names.

173. LITTLE, E. L., JR. **Notes on *Fraxinus* (Ash) in the United States.** *J. Wash. Acad. Sci.* 42 (12), 1952 (369–80). A.P.B.

A taxonomic study presenting some new combinations and a new species, *F. gooddingii*.

174. BACIGALUPO, N. M. Las especies argentinas de los géneros *Psychotria*, *Palicourea* y *Rudgea* (Rubiaceae). [**The Argentine species of *Psychotria*, *Palicourea* and *Rudgea*.**] *Darwiniana, B. Aires* 10 (1), 1952 (31–64). [Span.] A.P.B.

175. BACIGALUPO, N. M. Sinopsis preliminar del género *Calycophyllum* (Rubiaceae). [**Preliminary synopsis of the genus *Calycophyllum*.**] *Darwiniana, B. Aires* 10 (2), 1953 (145–56). [Span.] A.P.B.

Descriptions of species with a key and distribution map.

176. ASSEM, J. VAN DEN. **Revision of the Sapotaceae of the Malaysian area in a wider sense. IV. *Ganua* Pierre ex Dubard.** *Blumea* 7 (2), 1953 (364–400). [E.] O.R.S.

Discusses the history, morphology and delimitation, and distribution of the genus, and delimitations and interrelationships of the species, and describes and gives a key to 18 species.

177. ROYEN, P. VAN. **Revision of the Sapotaceae of the Malaysian area in a wider sense. V. *Manilkara* Adanson em. Gilly in the Far East.** *Blumea* 7 (2), 1953 (401–12). [E.] O.R.S.

Includes a key and a distribution map and describes 13 species. Six other species, incompletely known or extra-Malaysian species with new names and combinations are listed.

178. GORBATOFF, S. Quelques Sterculiacées arbustives de la région forestière entre les rivières Tshuapa et Lomela. [**Some shrubby Sterculiaceae of the forest region between the rivers Chuapa and Lomela.**] *Zooléo, Léopoldville* (*n.s.*) No. 24, 1954 (271–7). L.S.

179. BARKLEY, F. A. ***Lycium* in Argentina.** *Lilloa* 26, 1953 (177–238). [E.span.] A.P.B.

Descriptions of Argentine species (some new), with a key.

18. PLANT ECOLOGY

See also No. 11.

180. **Forest botany. Session 4: forest ecology.** *Proc. 7th int. bot. Congr., Stockholm 1950*, 1953 (309–13). [E., F. or G.]

Papers (with discussion) by: *V. J. Chapman* and *R. V. Mirams* on natural regeneration of Kauri [cf. *For. Abstr.* 12 (No. 2855)]; *W. von Wettstein* on biology of flowering in forest trees [cf. *For. Abstr.* 12 (No. 2843)]; *R. David* on brush control with 2,4-D [cf. *For. Abstr.* 12 (No. 2325)]; *H. Burger* on pruning, needle-stripping and increment of young Spruce and Pine [cf. *For. Abstr.* 13 (No. 156)]; and *E. Aichinger* on vegetation development types as a basis for agriculture and forestry. [Cf. *For. Abstr.* 14 (No. 2048).]

181. FROMENT, P. La phytogéographie et la phytosociologie en France du début du XIX^{e} siècle à nos jours. [**Plant geography and plant sociology in France from the beginning of the 19th century to the present day.**] *Bull. Soc. bot. France* 100 (7/9), 1953 (362–87). 341 refs. [F.] O.B.D.

A review of work achieved, with an extensive bibliography.

182. PURI, G. S. **Plant ecological research in India.** *Indian For.* 80 (8), 1954 (435–41). 63 refs.

181. *Mode of Life, Autecology. Silvicultural Characters of Trees*

See also Nos. 123, 608, 831, 838, 841.

183. CHABROL, R. B. P. Le mélèze dans les Pyrénées centrales (Haute-Garonne et Ariège). [**Larch in the central Pyrenees (Haute-Garonne and Ariège).**] [*Pap.*] *8th. int. bot. Congr. Paris, Sect. 13* 1954 (146–8). [F.] X.

Distribution and ecology.

184. OKSBJERG, E. Om *Picea omorika*. [**Notes on *P. omorika*.**] *Dansk Skovforen. Tidsskr.* 38 (2), 1953 (179–92). 3 refs. [Dan.]

A semi-popular review, dealing chiefly with the tree in its native habitat, some details of which are given, together with brief notes on its behaviour elsewhere in cultivation. For Denmark, its main advantages are its unexacting nature as regards water and soil nutrients, its high resistance to wind, salt deposits [cf. *For. Abstr.* 15 (No. 3685)] and frost, and the fact that, although inferior to Norway Spruce in volume yield on the best sites, it becomes progressively superior as site quality falls, thriving both on acid peats and dry sands. In view of these characters, it is destined for wider use in Danish heathland plantations.

185. BOUDY, P. Monographie et traitement du pin maritime. [**Silvicultural characters and management of *Pinus pinaster* [in North Africa].**] *Chêne-Liège* 60 (1492; 1493), 1954 (13–7; 17 . . . 23). [F.]

186. SCAMONI, A. Über die Verbreitung und die vegetationskundliche Stellung des Bergahorns im Flachland. [**The range and phytosociological position**

of *Acer pseudoplatanus* in the plains.] *Arch. Forstw.* 2 (4/5), 1953 (426–31). 24 refs. [G.]

Gives a map extending the hitherto accepted absolute northern limits of this species to SE. Denmark and southern Sweden, with an area of high concentration along the SW. Baltic coast. It occurs in the plains chiefly on fertile sites influenced by groundwater or to a less extent on loams of permanent freshness. Its distribution is paralleled by that of Beech but whereas the latter is confined, in the region between the hills and the recent glacial drift, to rainfalls of > 550 mm. or to groundwater-influenced sites, the Sycamore extends to very fresh, even wet e.g. Alder or Ash/Alder sites, while at the other extreme Beech occurs in quantity on drier sites lacking the freshness required by Sycamore. The sites and associations where the latter can be successfully raised are listed.

187. Sučić, J. O arealu pitomog kestena (*Castanea sativa* Mill.) na području Srebrenice, sa kratkim osvrtom na ostala nalazišta kestena u NR BiH. [**The *C. sativa* area in the Srebrenica region, with a brief survey of other stations of *C. sativa* in Bosnia and Herzegovina.**] [*Publ.*] *Inst. nauč. šum. Istraž., Sarajevo* 2 (4), 1953. pp. 154 + [1] + 27 photos + 3 tbls. + 3 maps. 39 refs. [Serb.serb. e.f.g.]

A detailed description of the *C. sativa* area near the town of Srebrenica, the most typical Chestnut area in (NE) Bosnia. Mean annual temperature is 9·4° C., mean May–August temperature 17·5°, and mean annual precipitation 989 mm. (moderate snowfall), with moderate winds. The soil belongs to 3 types: brown forest soil on andesite rock; forest podzolic soil, and black earth, both on phyllitic schists. The Chestnut is often found in mixture with Oak, Hornbeam, Beech, or Austrian Pine. Beech often displaces it, although the community is floristically similar to the *Querceto-castanetum croaticum*. Pure high-forest Chestnut (up to 1·8 m. d.b.h. and 30 m. high) has a growing stock of 350–400 cu.m./ha. and b.a. of 27–40 sq. m./ha. Regeneration is either by seed or by coppicing. The second Chestnut area (6854 ha.), the largest in Bosnia, lies in the NW. Here the stands form both low and high forest. In Herzegovina (catchments of the Neretva, Konjic and Proznov), there is a third area (89 ha.), under the influence of the Mediterranean climate. In all 3 areas, the Chestnut acreage is steadily diminishing under the pressure of Beech and Hornbeam. [Cf. *For. Abstr.* 16 (No. 303).]

188. Bouček, B. Hrušeň. [**The Pear tree.**] *Lesn. Práce* 33 (2), 1954 (57–62). [Cz.]

In connexion with the re-introduction of wild Pears into Czechoslovakian forests, information is given on the growth of *Pyrus communis*, its wood, seed, increment etc.

189. Tariel, J. Monographie du limba. [**Monograph on Limba [*Terminalia superba*].**] [*Proc.*] *1st Conf. for. interafric., Abidjan 1951*, 1952 (345–51). [F.e.]

Gives the characters, distribution, increment, silviculture, utilization and production in the Middle Congo. In 1950 the volume in cu.m. exploited was 46,000, of which 10,900 of logs and 3700 of sawn material were exported.

190. Koelmeyer, K. O. **Silvicultural notes on trees—Ebony (*Diospyros ebenum*, Koenig).** *Ceylon Forester (n.s.)* 1 (4), 1954 (159–164). 20 refs.

Distribution, silvicultural characters, regeneration, uses and wood properties.

191. Kadambi, K. ***Poeciloneuron indicum*, Bedd., its silviculture and management.** *Indian For.* 80 (6), 1954 (323–31 + 5 photos + map). 23 refs.

192. Kadambi, K. ***Hopea parviflora* Bedd., its silviculture and management [increment and yield].** *Indian For.* 80 (7), 1954 (390–408 + 5 photos + 1 map). 32 refs.

193. Kadambi, K. ***Cullenia excelsa*, Wight. (*C. zeylanica*, Gardner, *Durio zeylanicus*, Gardner).** *Indian For.* 80 (8), 1954 (442–5 + 1 photo + 1 map). 21 refs.

Distribution, silvicultural characters and wood properties.

194. Lamprecht, H. Caoba [***Swietenia candollei***.] *Bol. Ingen. for. Univ. Los Andes* 1 (3), 1954 ([33–4]). [Span.]

Brief notes on ecology and silviculture.

181.1. Distribution, Natural Range

195. Hustich, I. Barrträdsarternas polara gräns på norra halvklotet. [**The northern polar limits of the Coniferae.**] *Commun. Inst. for. Fenn.* 40 (29), 1952. pp. 20. 63 refs. [Sw.e.]

The circumpolar limits of the northern species of *Abies*, *Picea*, *Pinus*, *Larix*, *Juniperus*, and *Thuja* are shown on maps, and their distribution discussed.

196. Czeczott, H. **The past and present distribution of *Pinus halepensis* Mill. and *Pinus brutia* Ten.** [*Pap.*] *8th int. bot. Congr., Paris, Sect. 5* 1954 (196–7). X.

Pinus pithyusa, its variety *P. stankeviczi* and probably *P. eldarica* are considered to be synonyms of *P. brutia*; and *P. halepensis* and *P. brutia* two independent species. *P. halepensis* occurs in part of the Iberian Peninsula, southern France, Italy, part of the Balkan Peninsula, the North African mountains, Cyrenaica and Palestine, whereas *P. brutia* is limited to the north-eastern Mediterranean and the islands of Crete and Cyprus. Where their areas overlap, intermediate forms occur. Palaeontological evidence tends to confirm these facts and assertions.

197. Prioux, F. Régression du sapin pectiné dans les basses Vosges alsaciennes. [**Regression of Silver Fir in the lower Vosges of Alsace.**] [*Pap.*] *8th int. bot. Congr. Paris, Sect. 13* 1954 (148–51). [F.] X.

Abies alba at the lower altitudes of the Vosges has descended by means of favourable human intervention beyond its natural range. The *Querceto-abietum* here is not therefore stable nor a climax, and, at the slightest deficiency in nutrition or moisture the Fir is apt to regress.

198. Corillion, R. Sur la répartition et l'aire d'indigénat du charme (*Carpinus betulus* L.) dans le Massif armoricain. [**Distribution and natural range**

of *C. betulus* in the highlands of Brittany.] *Bull. Soc. bot. France* 100 (7/9), 1953 (320–3). 12 refs. [F.] O.B.D.

181.2. Atmospheric Relations. Acclimatization

See also Nos. 78, 93, 160–1, 239–42, 249, 348, 584–8.

199. Roussel, L. Nouvelles observations concernant l'influence de la radiation sur la croissance de certaines essences forestières résineuses. [**New observations on the influence of solar radiation on growth of certain coniferous forest species.**] [*Pap.*] *8th int. bot. Congr. Paris, Sect. 13* 1954 (98–100). [F.] X.

Presents the results of measurements of annual growth in *Abies alba* and *Picea abies* in the Levier national forest (Jura). It was noted that Fir receiving 25% radiation made growth equal to that made in the open. Reduction of radiation below this point resulted in decreased growth. A similar decrease in growth was observed in Spruce at radiations below 40–50%. At the same summer radiation values a cover of deciduous species is more favourable to growth of coniferous regeneration than a cover of coniferous species. [Cf. *For. Abstr.* 15 (No. 1029).]

200. Wettstein-Westersheim, W., and Grüll, H. Das photoperiodische Verhalten von Kiefernherkunften (*Pinus sylvestris* S.L.). [**The photoperiodic response of different Scots Pine provenances.**] [*Pap.*] *8th int. bot. Congr. Paris, Sect. 13* 1954 (17–9). [G.e.] X.

In short-day treatments of 2-year-old *P. sylvestris* from different altitudes, those from the 1000-m. level showed definite long-day behaviour. One provenance from 205 m. showed short-day behaviour, while another behaved intermediately and appeared to be adapted to higher altitudes. Short-day plants produced more organic matter than long-day plants when kept in normal light conditions. Normal-day plants on the whole had a higher needle/stem ratio as compared with darkened plants.

201. Vaartaja, O. **Photoperiodic ecotypes of trees.** *Canad. J. Bot.* 32 (3), 1954 (392–9 + 1 photo). 13 refs. O.R.S.

One-year seedlings of *Pinus sylvestris* and *Alnus incana* from N. and S. Finland were exposed to 10- and 24-hour photoperiods. Both sets of seedlings grew well under continuous illumination and poorly under the 10-hour photoperiod. The northern seedlings grew better than the southern ones under continuous light, but were more affected by the 10-hour photoperiod. Results showing the mean weight of seedlings after 135 days (Pine) and 180 days (Alder) are tabulated. Similar experiments with *Picea abies* from N. and S. Finland show similar results, but germination was slow and poor, and insufficient seedlings of the same stage were produced for results to be considered conclusive. *Larix sibirica, Populus tremula, Betula verrucosa, B. pubescens* and *Alnus glutinosa* from S. Finland also reacted typically and sensitively to photoperiods. Since the days of the growing season in N. Finland are extremely long and those in S. Finland relatively short, the difference in seedling growth is explained as being the result of heritable adaptation of the trees. The experimental results thus support the theory that within tree species there are 'photoperiodic ecotypes' which during evolution have adapted themselves to the photoclimate of their environment.

202. Pauley, S. S. **The photoperiodic response and its importance in tree improvement.** [*Pap.*] *8th int. bot. Congr. Paris, Sect. 13* 1954 (13–6). X.

Discusses the significance for the tree-breeder of the photoperiodic growth responses of species outside their normal day-length regime, and of the fact that (as in *Populus trichocarpa*) genetic diversity in photoperiodic response may occur locally among a species population under essentially uniform day-length conditions.

203. Ščeglova, O. A., and Leĭsle, F. F. O vlijanii prodolžiteljnosti dnja na formirovanie vegetativnyh i reproduktivnyh poček u vjaza. [**The influence of day length upon the formation of vegetative and reproductive buds in *Ulmus glabra*.**] *Dokl. Akad. Nauk SSSR* 95 (4), 1954 (893–5). 10 refs. [Russ.] A.P.B.

Shoots bearing 5 or more leaves, on a large tree known to flower every year, were given a 9-hour day (1) from 19 June for 26 days (6 shoots), (2) from 23 June for 22 days (2 shoots) and (3) from 25 June for 20 days (5 shoots). Controls grew in the natural day of ca. 19 hours, and after 15 July all shoots were exposed to the natural day—ca. 18 hours. The treated shoots were covered by double paper bags, the inner black and the outer white (to exclude heating effects), from 6 p.m. to 9 a.m. A check in the following spring (1953) showed that the buds on (1) were all vegetative, with the exception of one reproductive bud on one shoot, and on (2) all but one of the buds on each shoot were vegetative. The reproductive buds in both groups later formed an unusually low number of fruits. For (3), results were indistinguishable from controls, the number of reproductive buds varying from 1 to 4 per shoot.

204. Larcher, W. Die Kälteresistenz mediterraner immergrüner Holzpflanzen. [**Frost-resistance of Mediterranean evergreen woody species.**] [*Pap.*] *8th int. bot. Congr. Paris, Sect. 11* 1954 (276–8). [G.f.] X.

Leaves and green shoots of some Mediterranean species were tested at different seasons for frost resistance by keeping them at various constant temperatures between − 3° and − 20° C. Resistance varies throughout the year, according to the species, minimum resistance being encountered in summer, and maximum in winter. Winter resistance can be reduced by keeping branches in warm conditions. Increase in frost-resistance in winter seems to depend primarily upon a hardening of the protoplasm.

205. Pisek, A. Frosthärte und Austrocknungsresistenz bei immergrünen Arten der alpinen Waldgrenze. [**Frost- and drought-resistance in evergreen species of the alpine forest limit.**] [*Pap.*]

8th int. bot. Congr. Paris, Sect. 11 1954 (274–6). [G.f.] X.

Experiments with leaves of various species, including *Pinus cembra* and *Picea abies*, from an altitude of 1900 m., showed marked variations in frost resistance according to the season, the maximum being reached in winter. Resistance to drought also follows a seasonal rhythm, reaching a maximum in winter.

181.3. Water, Soil and Root Relations (including Bacterial and Mycorrhizal Symbiosis)

See also Nos. 27, 31–2, 39, 46, 81–2, 99, 205, 242–4, 246, 254, 320–2, 325, 418, 513, 740, 1252.

206. **Experimental ecology: Session 2: water balance.** *Proc. 7th int. bot. Congr., Stockholm 1950*, 1953 (229–32). [E., G., or F.]

Includes papers (with discussion) by: *A. Pisek*, in German, on transpiration of Spruce [cf. *For. Abstr.* 12 (No. 2662)]; *R. D. Gibbs* on seasonal changes of water content in trees [cf. *For. Abstr.* 12 (No. 2655)]; *C. Killian* on the water balance of vegetation types during the dry season in Guinea; and *A. Heilbronn* on the ecological role of essential oils.

207. **Experimental ecology: Session 3: drought resistance.** *Proc. 7th Int. bot. Congr., Stockholm 1950*, 1953 (232–6). [G. or E.]

Includes papers (with discussion) by: *O. Stocker* on the conception of drought resistance; *H. Walter* on osmotic value as indication of water balance in different climates; *H. R. Oppenheimer* on summer drought and water balance in the Near East.

208. Fraser, D. A. **Ecological studies of forest trees at Chalk River, Ontario, Canada. 1. Tree species in relation to soil moisture sites.** *Ecology* 35 (3), 1954 (406–14). 15 refs.

An 8-acre plot was chosen, where distribution, growth and condition of trees could be related to environmental conditions. Soil moisture regimes were delimited according to soil profile development. The fluctuations of the water-table were noted on different sites for the 1949–52 period. Yellow Birch, Sugar Maple, and Basswood were found on all moisture regimes occurring on the plot. White [Paper] Birch and Red Oak were restricted to the drier sites, and Black Ash and Red Maple to the wetter ones. Optimum moisture regimes for various species were assigned by maximum number and b.a. of trees/acre. Plot data were supplemented by reconnaisance studies to establish the occurrence of tree species over the complete range of soil-moisture conditions. Details of air and soil temperature, soil moisture, radial growth, and condition of trees will be considered in a separate publication. [Cf. *For. Abstr.* 15 (No. 1197).] *From author's summary.*

209. **Experimental ecology: Session 9: Soils.** *Proc. 7th int. bot. Congr., Stockholm 1950*, 1953 (259–62). [E.]

Includes papers (with discussion) by: *W. H. Pearsall* on ecology of wet soils in Britain [cf. *For. Abstr.* 12 (No. 2641)]; *V. J. Chapman* and *J. W. Ronaldson* on Mangrove soils in New Zealand [cf. *For. Abstr.* 12 (No. 2642)]; *E. Gorham* on soil status and nutrient uptake by natural vegetation [cf. *For. Abstr.* 12 (No. 2652)].

210. **Experimental ecology: Session 7: forest sites.** *Proc. 7th int. bot. Congr., Stockholm 1950*, 1953 (250–3). [E.]

Includes papers (with discussion) by: *S. O. Heiberg* and *D. P. White* on K deficiency of coniferous plantations [cf. *For. Abstr.* 12 (No. 3346)]; *L. Leyton* on growth and mineral nutrition of trees on *Calluna* sites [cf. *For. Abstr.* 12 (No. 2632)]; *H. Robak* on check of young Spruce on *Calluna* sites [cf. *For. Abstr.* 12 (No. 2631)]; *C. O. Tamm* on growth and nutrient consumption of a moss community [cf. *For. Abstr.* 12 (No. 2653)].

211. Uchida, T., and Tsuda, K. **[Manuring experiments on *Larix* (2). The influence of the mechanical texture of the soil on the growth of young trees.]** *J. Jap. For. Soc.* 36 (7), 1954 (193–5). 2 refs. [Jap.e.]

Of the fully-manured soils—loam sand, light clay and volcanic ash—loam sand proved the most and light clay the least suitable to growth of Larch seedlings. [Results are given in tables and graphs with some English legends.] *From authors' summary.*

212. Tjulin, A. F., and Ščerbina, K. G. Biologičeskiĭ krugovorot azota i fosfora meždu rastiteljnostjju i počvoĭ v širokolistvennyh lesah južnoĭ časti lesostepi za vegetacionnyĭ period. **[The biological cycle of N and P between vegetation and soil in the deciduous forests of the southern portion of the forest-steppe during the growing season.]** *Dokl. Akad. Nauk SSSR* 97 (1), 1954 (125–8). 11 refs. [Russ.] A.P.B.

A further partial report on work in the Tellerman forest [cf. *For. Abstr.* 15 (No. 2330)], adding the following information: (1) Despite the naturally high fertility of the soil, applications of phosphate increased the acorn crop by 5, and of complete fertilizer by 8. (2) When N and P are low in the soil, root growth slackens, bacterial populations decrease, and fungi increase in the soil. (3) The lapse of N and P in the soil in the first part of the growing season is associated with increase of P and sugars in the roots and a relative increase of amino-acids in the leaves (in spite of a drop in their total N and P contents). (4) Stronger root growth was observed on plots treated with fertilizer or trace elements.

It is concluded that these facts are explained by the need for the presence of sugars, simple N compounds and phosphates for the synthesis of amino-acids in the roots, and the rôle of fertilizing on this fertile soil is seen as that of supplying nutrients at a time when they are in great demand for root growth.

213. Åslander, A. **Lime and agricultural plants. A discussion of the problem in its bearing on plant ecology.** *Proc. 7th int. bot. Congr., Stockholm 1950*, 1953 (262–5). [E.]

Deals mainly with the effects of liming on agricultural crops. Analyses of soil samples collected in various plant habitats on Kinnekulle, S. Sweden, showed that *Picea abies* dominates where the soil

has a low content of easily available P, and *Betula alba* on soil with a somewhat higher P content. *Quercus sessiliflora, Fraxinus excelsior, Tilia cordata, Prunus* spp. and *Fagus sylvatica* seemed to thrive only on soils comparatively rich in P. It is concluded that amounts of easily available plant nutrients, often P, play a greater part than lime content or soil reaction in determining crop yields and plant distribution.

214. Cecconi, C. A. L'azione dell' *Abies alba* e della *Pseudotsuga douglasii* sull' evoluzione del processo pedogenetico. [**The influence of *A. alba* and *P. taxifolia* on soil formation.**] *Ann. Sper. agr.* (*n.s.*) 8 (4), 1954 (1055–71). 9 refs. [It.it.e.] C.G.B.

Analysis of soil data from plots planted with *A. alba* and *P. taxifolia* in the forest of Vallombrosa (pH, C/N ratio, total and soluble proteins, exchangeable Ca, hemicelluloses, cellulose, and lignin) showed no discernible difference in the influence of these two species on the process of soil formation.

215. Dimbleby, G. W. **The origin of heathland podzols and their conversion by afforestation.** [*Pap.*] *8th int. bot. Congr. Paris, Sect. 13* 1954 (74–80). X.

A summary of investigations carried out on Yorkshire moorlands. [Cf. *For. Abstr.* 14 (Nos. 1038, 2103, 3196).]

216. **Mycology and bacteriology. Session 8: mycorrhiza and related subjects.** *Proc. 7th int. bot. Congr., Stockholm 1950*, 1953 (435–9). [E. or F.]

Papers (with discussion) by: *E. Melin* on recent studies on the nature of tree mycorrhizae [cf. *For. Abstr.* 15 (No. 1173)]; *B. Peyronel* on the study of mycorrhiza by direct observation [cf. *For. Abstr.* 12 (No. 2614)]; *D. T. MacDougal* and *J. Dufrenoy* on mycorrhiza of excised roots of *Pinus radiata*; and *E. Björkman* on a new theory for the formation of ectotrophic mycorrhiza [*cf. For. Abstr.* 5 (p. 160)].

217. Wilde, S. A. **Mycorrhizal fungi: their distribution and effect on tree growth.** *Soil Sci.* 78 (1), 1954 (23–31). 39 refs.

A review and summary of research.

218. Wilde, S. A. La symbiose des arbres et des organismes inférieurs: sa nature et son importance en sylviculture. [**Symbiotic relationships between trees and lower organisms: their nature and importance for silviculture.**] [*Pap.*] *8th int. bot. Congr. Paris, Sect. 13* 1954 (123–6). [F.] X.

219. Levisohn, I. **Tests for the pseudomycorrhizal group of soil fungi.** *Nature* 174 (4426), 1954 (408–9). [Bedford College, University of London.]

A convenient method has been employed for differentiating between mycelia belonging to the so-called pseudomycorrhizal group (forms of *Rhizoctonia* and *Mycelium radicis atrovirens*) and mycelia regarded as 'trivial' soil fungi which, so far, have not been observed to infect the roots of forest trees. Cones of filter-paper, cottonwool and similar cellulosic materials are placed in Erlenmeyer flasks in such a way that they are constantly moistened by capillary rise from the nutrient solution contained in the flasks. *Rhizoctonia* and *M.r. atrovirens* grow well on these cones and after 3–4 weeks the mycelium invades the fibres of the cellulosic material, and many of the hyphae, after frequent cell divisions, give rise to a well-defined structure very similar to that of an intercellular net present in pseudomycorrhizal associations of living root tissues. None of the large number of 'trivial' soil fungi tested (*Alternaria, Stemphylium, Pullularia, Chaetomium* etc.), though growing vigorously on the surface of the cones, has been observed to form a net structure within the fibres. Neither was net formation recorded for true mycorrhiza-formers under the cultural conditions described.

220. Levisohn, I. **Occurrence of ectotrophic and endotrophic mycorrhizas in forest trees.** *Forestry* 27 (2), 1954 (145–6).

Reviews briefly the uncertainty of the relationship between taxonomic position of forest tree species and type of mycorrhiza (i.e. ectotrophic or endotrophic), and records a recent case of double infection of a Lawson Cypress (*Chamaecyparis lawsoniana*) with both forms of mycorrhiza on a heathland soil in the south of England. [Cf. *For. Abstr.* 15 (No. 146).]

221. Wahl, I. **Mycorrhiza of Aleppo Pine in Israel.** [*Pap.*] *8th int. bot. Congr. Paris, Sect. 13* 1954 (130). X.

222. Krammer, P. J., and Hodgson, R. H. **Differences between mycorrhizal and non-mycorrhizal roots of Loblolly Pine.** [*Pap.*] *8th int. bot. Congr. Paris, Sect. 13* 1954 (133–4). X.

Mycorrhizal roots (*a*) contained more than twice as much dry matter (expressed as % of fresh weight), and had only about half as much surface area per unit of dry matter as non-mycorrhizal roots; (*b*) absorbed ca. 1·4 times as much O per unit of fresh weight as non-mycorrhizal roots, but considerably less O per unit of dry weight and per unit of surface. Absorption of certain mineral elements per unit of surface is also greater in mycorrhizal roots.

223. Robertson, N. F. **Studies on the mycorrhiza of *Pinus sylvestris*. 1. The pattern of development of mycorrhizal roots and its significance for experimental studies.** *New Phytol.* 53 (2), 1954 (253–83 + 4 photos). 42 refs. [Botany School, University of Cambridge.] O.R.S.

Roots of adult and seedling Scots Pine were studied in the field and the following observations made: (1) The red-brown forked mycorrhizae, without macroscopically obvious external hyphae, develop, from short roots, in acropetal succession along the length of the long root. (2) This acropetal development of mycorrhizal short roots is associated with the development of a Hartig net in the long root. (3) In long roots beginning to elongate in the spring, the Hartig net can extend into the new long root either directly or by an external weft of mycelium. (4) The short roots developed on long roots showing Hartig-net development become infected, by way of the mycelium in the cortex of the long root, after they have broken out of the cortex. (5) A study of pseudomycorrhizal short roots suggests that short roots near the tip and base of long roots may become pseudomycorrhizal most frequently. (6) The pseudomycorrhizal fungus group *Mycelium radicis atrovirens* agg., can be isolated from the

exterior of healthy elongating long roots, where it is apparently the dominant fungus. (7) In experiments, living seedlings proved to be a good source of mycorrhizal inoculum but detached seedling roots were not. (8) Mycorrhizal inoculum is air-borne and may probably, e.g. in *Boletus granulatus*, consist of basidiospores. These findings are discussed. *From author's summary.*

224. MELIN, E. **Growth factor requirements of mycorrhizal fungi of forest trees.** *Svensk bot. Tidskr.* 48 (1), 1954 (86–94). 8 refs. [E.] O.B.D.

A study of the growth-promoting effects of root metabolites on different tree-mycorrhizal fungi. Aseptic Pine roots were grown in a nutrient solution for about 5 months. This solution was then replaced by a medium of a type previously used in studies of the vitamin and amino-acid requirements of the fungi concerned. The basic solutions were supplemented with thiamine or with a mixture of B vitamins plus a mixture of amino-acids. The flasks were then inoculated with mycorrhiza-producing fungi. After 2 days, in the case of rapid-growing fungi, a heavy development of mycelia round the roots was observed, whereas in control flasks with no roots present the growing mycelia were scarcely visible. The growth-promoting effect of the roots varied for different fungi; it was greatest for slow-growing species such as *Russula xerampelina*. Excised living tomato roots had the same effect as Pine roots. [Cf. *For. Abstr.* 9 (No. 53).]

225. LEVISOHN, I. **Influence of mycorrhizal mycelium on forest tree seedlings in the absence of mycorrhizal infection.** [*Pap.*] *8th int. bot. Congr. Paris, Sect. 13* 1954 (131–2). X.

Experiments with pot-cultures showed that the introduction of mycorrhizal mycelia into soils stimulates seedling growth (1) before the establishment of mycorrhizal association is observable, and (2) irrespective of mycorrhiza formation at a later date. Further experiments in which root portions of actively growing Scots Pine seedlings were allowed to develop in leaching water from their own pots, showed that whenever the soil in the pot cultures carried active mycorrhizal media, there was profuse and regular forking of the roots developing in the leaching water, although the forked roots were invariably non-mycorrhizal. [Cf. *For. Abstr.* 15 (No. 146).]

226. MORRISON, T. M. **Uptake of phosphorus-32 by mycorrhizal plants.** *Nature, Lond.* 174 (4430), 1954 (606–7). 2 refs. [University of Otago, N.Z.]

Leaves of mycorrhizal plants of *Pinus radiata* were markedly more active in uptake of P^{32} than those of non-mycorrhizal plants. No similar consistent difference was noted in *Nothofagus menziesii.*

227. HARLEY, J. L., and BRIERLEY, J. K. **The uptake of phosphate by excised mycorrhizal roots of Beech. VI. Active transport of phosphorus from the fungal sheath into the host tissue.** *New Phytol.* 53 (2), 1954 (240–52). 5 refs. [Department of Botany, University of Oxford.] O.R.S.

[Cf. *For. Abstr.* 15 (No. 3241).] (1) An account is given of experiments which help to determine a route by which phosphate passes through the fungal tissue into the host tissues of Beech mycorrhizae. (2) After a period of absorption of phosphate from a solution of 0·161 *mM* potassium phosphate (5 mg. P/litre) in 0·01 *M* phthalate buffer at pH 5·5, mycorrhizal roots were washed in phosphate-free buffer. P^{32} moved from the sheath into the core at room temperature during washing. (3) The rate of movment of P^{32} was temperature-sensitive and became very slow at 1° C. The Q 10 of the process of transport was high. (5) The process of transport was sensitive to O concentration. It became very slow in rate when the O concentration in the washing solution was below 3%. (6) In low O concentrations and in anaerobic conditions especially, P^{32} was lost from the roots in the washing solution at normal temperatures. No such losses occurred at low temperatures in either aerobic or anaerobic conditions nor at normal temperatures in air. The loss of P^{32} from roots in anaerobic conditions was entirely from the fungal tissue and resulted from a process which had a high temperature coefficient. (7) In roots which had been returned to normal temperatures after a period of washing at low temperatures or returned to aerobic condition after a period of washing in anaerobic conditions, transport of P from fungus to host, temporarily prevented, was resumed at an undiminished rate. (8) It is concluded that active transport of P from fungus to host occurs in mycorrhizal Beech roots. The mechanism of transport is dependent upon aerobic metabolic processes in the fungal tissue as well as upon the absorptive processes of the core. The phosphate which is lost from roots kept in low O concentrations is entirely released from the sheath and results from temperature-sensitive anaerobic processes occurring in that tissue. *Authors' summary.*

228. HARLEY, J. L. **Salt absorption by Beech mycorrhizas.** [*Pap.*] *8th int. bot. Congr. Paris, Sect. 13* 1954 (127–8). X.

Cf. *For. Abstr.* 14 (No. 3162).

229. BAYLIS, G. T. S. **Experiments with mycorrhizas of some New Zealand plants.** [*Pap.*] *8th int. bot. Congr. Paris, Sect. 13* 1954 (135–6). X.

Brief notes on experiments with *Pernettya macrostigma*, *Nothofagus menziesii* and *Griselinia littoralis.*

230. BOND, G. **The formation and function of some non-legume root nodules.** [*Pap.*] *8th int. bot. Congr. Paris, Sect. 21* 1954 (14). X.

Notes on the nodules found on *Alnus glutinosa*, *Myrica gale* and *Hippophae rhamnoides.*

231. YLI-VAKKURI, P. Tutkimuksia puiend välisistä elimellisistä juuriyhteyksistä männiköissä. **[Studies of organic root-grafts between trees in *Pinus sylvestris* stands.]** *Prepr.* from *Acta for. fenn.* 60 (3), 1953. pp. 117. 119 refs. [Fi.fi.g.]

After reviewing earlier research in the subject, the author describes his own studies, in which 3795 trees on 264 plots in 41 roughly similar natural Pine stands in Southern Finland were investigated. The following conclusions are drawn: (1) In general, the frequency of root-grafts increased with increasing diameter class in mature natural stands, in which

21–28% of trees had root-grafts with other trees. In quite young stands, little or no root-grafting was found. Grafts occurred most frequently in dominants, and the nearer together and the more vigorous the trees. (2) Most of the trees investigated had root-grafts with one or two living trees or stumps, which in turn might be connected with others, so that networks of 10 or more connected trees and stumps might be found. Most of the grafts were between superficial roots. (3) Grafts took place chiefly when trees were in the development stage (30–60 years old) and their roots thin (1–2 cm. diam.). (4) Investigation of the movement of water in connected root systems showed that these could, at least to some extent, make use of each other's water supply. (5) It was ascertained by radioactive-tracer methods (using P^{32}) that nutrients can be transferred from one tree to another by root-grafts. (6) Stumps of felled trees that have root-grafts with healthy roots of living trees, may remain sound for as long as 10 years, apparently owing to heavy secretion of resin. [Cf. *For. Abstr.* 15 (No. 2335).]

232. Hasegawa, K., and Konoe, R. **[The root system and TR-ratio of *Metasequoia* cuttings.]** *J. Jap. For. Soc.* 36 (6), 1954 (164–7). [Jap.jap.e.]

In studies of *Metasequoia* cuttings and seedlings of 6 conifers in the same environment, seedlings of *Taxodium* approached most closely in root system and top/root ratio to *Metasequoia*. *From authors' summary.*

233. Richardson, S. D. **Root growth of *Acer saccharinum* seedlings during winter.** [*Pap.*] *8th int. bot. Congr. Paris, Sect.* 11 1954 (303–4). 2 refs. [E.] X.

Root growth of *A. saccharinum* seedlings is possible before visible leaf expansion provided that: (1) the low temperature requirement for overcoming bud dormancy has been satisfied (this requirement is equivalent to 2 months at a shoot temperature below 5° C. and is not influenced by root temperature); and (2) shoot temperature is between 5° and 10° and root temperature about 5°.

181.4. Reaction to Biotic Influences (Competition etc.) and Fire

See also Nos. 245, 247–8, 263–6, 281, 322, 404, 418, 424, 452.

234. Stone, E. L., and Stone, M. H. **Root collar sprouts in Pine.** *J. For.* 52 (7), 1954 (487–91). 13 refs.

A study of 6 species of Pine showed that 'root-collar' shoots arise from buds in the axils of primary needles, those just above the cotyledons generally bearing these buds most abundantly. The assumption (from their occurrence below lateral roots) that shoots may arise from root tissues is due to distortion, subsequently concealed by growth. No adventitious buds were found, and decapitation below cotyledons resulted in no regeneration of shoots. That these buds produce coppice shoots in older stems after long dormancy is of minor silvicultural interest but it is important in the survival of seedlings injured by fire, grazing or cutting and even in normal nursery conditions (*P. palustris*). Published illustrations (cf. Troup: *P. longifolia*) suggest wider applications. [Cf. *For. Abstr.* 5 (p. 167).]

181.5. Reproductive Behaviour

See also Nos. 92, 94, 199, 203, 337 *et seq.*

235. **Experimental ecology. Session 4: dissemination and colonization.** *Proc. 7th int. bot. Congr., Stockholm 1950*, 1953 (236–9). [E.]

Includes papers (with discussion) by: *B. Pettersson* on dispersal of wind-borne pollen of northern phanerogams [cf. *For. Abstr.* 12 (No. 2723)]; *K. Faegri* on long-distance pollen transport; *E. Conway* on the spread of bracken.

236. McNeill, W. M. **Observations on cone and seed production in plantations of Scots Pine in Scotland.** *Forestry* 27 (2), 1954 (122–33).

The results of investigations over a period of 5 years (1948–52) in a typical stand of planted Scots Pine in Aberdeenshire are presented. A marked fluctuation in cone production per tree during the period was observed. An examination of the meteorological data suggests a possible correlation between cone production and the temperature at the time of flowering. The number of seeds per cone varies within wide limits. Marked variation in cone type was observed but without a systematic classification of cone types for the species it is not possible to connect type with productivity. A significant relationship between dominance and both cone and seed production was established. A comparison between visual estimates and actual counts of cone crops revealed that a high degree of accuracy can be obtained by visual estimate. *From author's summary.*

237. Sarvas, R. **On the flowering of Birch and the quality of seed crop.** *Commun. Inst. for. Fenn.* 40 (7), 1952. pp. 38. 40 refs. [E.fi.]

Describes a 7-day, self-recording meter for measuring pollen content of the air. By the use of this instrument the general course of the annual cycle of pollen shed of Birch (*Betula verrucosa* and *B. pubescens*) has been established. It is characterized by an intense maximum at the commencement of flowering, which lasts 2–3 days during which 70–80% of the total pollen is shed. Diurnal variations have also been determined: there is a maximum at ca. 16·00 hr. and a minimum, approaching zero, between 22·00 and 06·00 hr. Differences in the degree of pollination in different years have also been classified. Absolute pollen shed during 1946–51 varied from 2 to 125 grains/sq. mm. In most years the pollination of ♀ flowers was adequate. The influence of weather on the annual and diurnal cycles seemed relatively slight. A comparison of pollen shed and % of germinable seed showed a distinct correlation. As the average quality of Birch seed is relatively poor, it is advisable, in collecting seed, to devote more attention to pollination conditions. The best germinable seed is obtained from pure stands in years of abundant flowering.

238. Cameron, H. **Melting point of the bonding material in Lodgepole Pine and Jack Pine cones.** *Silv. Leafl. For. Br. Can.* No. 86, 1953. pp. 3. 1 ref.

The melting points for the petroleum/ether extracts of the cone-bonding material found at the tip of the scales were 45·5 and 50° C. for Lodgepole and Jack Pine respectively. The figure for Lodgepole Pine is similar to the scale separation temperature of the cones, measured by water immersion, while that for Jack Pine is rather higher.

239. Björkman, E. **Swedish studies on the influence of light upon reproduction in coniferous forest.** [*Pap.*] *8th int. bot. Congr. Paris, Sect. 13* 1954 (93–7). X.

A review of work since 1907.

240. Hosoi, M., and Matsumoto, M. **[Effect of local hindering of solar radiation on height growth of natural seedlings of *Pinus densiflora*.]** *J. Jap. For. Soc.* 36 (6), 1954 (159–63). 9 refs. [Jap.jap.e.]

Studies on a small clear-felled area showed that seedling growth was less vigorous in parts nearest the residual stand and in other parts where, because of the local topography or the presence of trees, exposure to direct sunlight was below 50% of that in the open. *From authors' summary.*

241. Fraser, J. W., and Farrar, J. L. **Effect of shade on Jack Pine germination.** *Silv. Leafl. For. Br. Can.* No. 88, 1953. pp. 3.

Three sets of experiments indicate that partial shade (provided in the experiments by logs placed in the test areas or by screens) creates conditions favourable to germination.

242. Fraser, J. W., and Farrar, J. L. **Effect of watering, shading, seed-bed medium, and depth of sowing on Jack Pine germination. Project P-366.** *Silv. Leafl. For. Br. Can.* No. 90, 1953. pp. 4. 3 refs.

The effects of combinations of variations in moisture, seedbed medium, light, and depth of sowing, and analysis of variance of the data are tabulated. Conditions favouring a high moisture content in the seed (fine-textured medium, watering, shading and sowing below the surface) resulted in good germination.

243. Farrar, J. L., and Fraser, J. W. **Germination of Jack Pine seeds on humus.** *Silv. Leafl. For. Br. Can.* No. 91, 1953. pp. 2.

Germination in the laboratory and in the field was good in finely ground humus; germination was also good in heavily watered natural humus. These experiments appear to indicate that poor germination in humus is caused, not by chemical substances, but by lack of available moisture.

244. Rudnicki, J. Wyniki siewów brzozy przy różnej kwasowości gleby. **[Results of Birch sowings in soils of different acidity.]** *Sylwan* 97 (3), 1953 (205–9). [Pol.]

Measurements of soil acidity in sites with natural regeneration of *Betula verrucosa* have shown a pH value of 5–5·5, while sites with pH < 5 showed no natural regeneration. These findings were checked by laboratory tests. The % of survival (and, to a certain extent, the height) of seedlings of *B. verrucosa* increased from 0 to 6·8% (height 14 to 24 mm. after 6 months), as the pH of the soil (and that of the watering water) increased from 4 to 7. It was also found that the seeds did not germinate at pH < 5, and between 5 and 7 the germination % varied from $\frac{1}{5}$ to $\frac{2}{3}$ of the maximum germination accepted for these seeds (31%), the probable optimum pH being 6·5.

245. Hürlimann, H. L'étude du développement des plantes jeunes dans les forêts tropicales. **[The development of young plants in tropical forest.]** [*Pap.*] *8th int. bot. Congr. Paris, Sect. 7* 1954 (187–8). [F.] X.

Recommends the method of E. Schmid for the study of growth and competition in young plants regenerating naturally in the forest.

246. Bourdeau, P. **Oak seedling ecology determining segregation of species in Piedmont Oak-Hickory forests.** *Ecol. Monogr.* 24 (3), 1954 (297–320). 39 refs.

This investigation was made to determine reasons for the segregation of Oaks in the Piedmont upland Oak/Hickory forest into types related to site quality—(1) White Oak/Red Oak/Black Oak on the best sites, (2) White Oak/Post Oak on sites of intermediate quality, and (3) Post Oak/Blackjack Oak on the poorest sites. The results of the study (presented in graphs and tables) support the belief that insufficient drought resistance explains the exclusion of good-site species from the poor sites, and intolerance of shade and lower growth rate explain the exclusion of poor-site species from good sites.

181.6. Life Form, Habit. Post-Seedling Development and Form

See also Nos. 469, 761, 775.

247. Vité, J. P. Unterschiedliche Anfälligkeit von *Larix europaea, leptolepis* und deren Bastarden gegen den Lärchenblasenfuss (*Taeniothrips laricivorus* Krat.) als mögliche Ursache verschiedener Wipfelformen. **[Varying susceptibility of *L. decidua, L. leptolepis* and their hybrids to attack by *T. laricivorus* as a possible cause of differences in crown form.]** *Z. Forstgenet.* 3 (4), 1954 (86–7). 5 refs. [G.]

Criticizes the findings of Mudrich [cf. *For. Abstr.* 14 (No. 2030)], and asserts that crown forms in the *Larix decidua* and some of the hybrids studied show typical symptoms of attack by *Taeniothrips laricivorus.*

248. Mudrich, H. Stellungnahme zu J. P. Vité 'Unterschiedliche Anfälligkeit von *Larix europaea, leptolepis* und deren Bastarden gegen den Lärchenblasenfuss (*Taeniothrips laricivorus* Krat.) als mögliche Ursache verschiedener Wipfelformen'. **[Reply to J. P. Vité's 'Varying susceptibility of *L. decidua, L. leptolepis* and hybrids to attack by *T. laricivorus* as a possible cause of differences in crown form',]** *Z. Forstgenet.* 3 (4), 1954 (87–8). 2 refs. [G.]

[Cf. preceding abstract.] Replies to criticisms of definitions of crown form and states that when changes in crown form due to insect attack are taken into account the position with regard to differences between *L. decidua* and *L. leptolepis* remains substantially the same.

249. Jacobs, M. R. **The effect of wind sway on the form and development of *Pinus radiata* D.**

Don. *Aust. J. Bot.* 2 (1), 1954 (35–51). 4 refs. O.B.D.

[Cf. *For. Abstr.* 2 (p. 33).] Measurements on the experimental plots established in 1936 were continued for 6–15 years and a further report is here presented. Free-swaying trees grew more in diameter over the lower part of the trunk than stayed trees. After 10 years the increased growth due to sway could be detected to a height on the trunk of between 25 and 30 ft. The effect of sway at a height of 4 ft. was greater in a very heavily thinned test area than in a well stocked area. Sway caused increased diameter growth of roots near the trunk and increased excentric trunk development along the line of the main winds. The height growth of the stayed trees was little different from that of the free-swaying trees, but height/diameter relationships were changed. After 2 years trees that had been prevented from swaying were no longer stable in a normal environment. When the upper parts of stayed trees were allowed to sway the trees made good use of the factors of the locality for 8 years. In a series where stayed trees were prevented from swaying throughout their length, progressive suppression of diameter and volume increment was observed over 15 years. Individual reaction to the stimulus of sway appeared to be one of the factors that contributed to the progressive assertion of dominance by certain trees. *From author's summary.*

250. Lukkala, O. J. Rämemäntyjen perinnöllisyydestä. **[On the heredity of *räme* Pines.]** *Commun. Inst. for. Fenn.* 40 (12), 1952. pp. 22. [Fi.e.]

A study of regeneration of Pine on drained and undrained *räme* (wet peat-moor bearing Pine) leads to the conclusion that the slow growth and poor form of *räme* Pine is the result of environmental rather than genetic factors.

181.7. Duration, Longevity, Stature; Records of Exceptional Age or Size. Effects of Age on Behaviour

251. Schulman, E. **Longevity under adversity of conifers.** *Science* 119 (3091), 1954 (396–9). 12 refs. O.R.S.

During some 15 field seasons investigations have been made on over-age conifers on marginal sites in semi-arid regions of the Western U.S.A. Special characteristics of the oldest individual trees seem to be: low height-growth/diam. ratio; sparse foliage; smooth, thin bark; endogenous dieback (longitudinal retreat, over centuries, of the cambium edge of the leaders); lateral retreat of the cambium edge in some species, shown by barkless stem areas or by barkless strips along the branches, down the stem and along exposed roots. Work in the last 2 seasons shows that the verifiable maximum age of certain *Pinus* spp. exceeds the long-established limits; the trees of great longevity were all found in environments limited in moisture, temperature, or both. Tabulated figures are given showing characteristics of the oldest known drought conifers of the species *Pinus aristata, P. flexilis, P. edulis, P. ponderosa, Pseudotsuga macrocarpa, P. taxifolia* var. *glauca, Juniperus scopulorum* and *J. occidentalis* with a wet-climate species, *Fitzroya cupressoides*, for comparison. The two oldest Pines (*P. aristata* and *P. flexilis*) show respectively 1658 and 1495 years of growth in increment cores. In several thousand drought conifers sampled, the total radial growth of a century was commonly less than 15 mm., and exceptionally less than 10 mm., with a minimum of 8 mm. in the lower part of the stem. Local absence of rings in an increment core appeared to be rare in over-age conifers in the central and N. Rocky Mountains and at altitudes over 8000 ft. in the SW. Even at altitudes of 10,000 ft. or as far north as lat. 51°, however, in a small fraction of the cores 5 or more annual rings might be missing in a century. Some factors possibly relevant to the longevity of these trees are: the areas of maximum ages for each species have maximum numbers of hardy over-age trees; extremely slow-growing over-age trees appear to be free of centre rot at ages associated with considerable centre rot in fast-growing favourably situated trees of the same species; open stands, rocky sites, stunted size, and sparse vegetation appear to inhibit the direct agents of destruction; individuals suffering from severe mechanical injury produced excess resin, perhaps inhibiting decay; in *Pseudotsuga taxifolia* and the Pines, endogenous dieback found at the tips in trees 400–500 years old culminated in trees centuries older with only 1 or 2 living branchlets; and a laterally retreating cambium edge has reached the point in some of the oldest trees where only a single thin vertical or spiral strip of bark remains, although the trees show little or no sign of centre rot.

252. Wagener, W. W.; Schulman, E. **Longevity under adversity of conifers.** *Science* 119 (3103), 1954 (883–4). O.R.S.

Comment on the preceding article by Schulman, with his reply.

181.8. Phenology

See also Nos. 200–3, 233, 273.

253. Cottam, W. P. **Prevernal leafing of Aspen in Utah Mountains.** *J. Arnold Arbor.* 35 (3), 1954 (239–50). 4 refs.

Striking differences are observable in time of flushing within the Aspen (*Populus tremuloides* var. *aurea*) groves of this region. In general, late-flushing forms predominate at low and medium, and early-flushing forms at higher altitudes. At medium altitudes stands of the 2 forms are sharply discontinuous. Temperature studies were made in 3 different areas. In the Stansbury Mountains prevernal flushing appeared to be conditioned by temperature. In the Abajo Mountains and at Mt. Timpanogos in the Wasatch Range, the early- and late-flushing colonies seemed not to depend on temperature, but to represent different genetic strains. Transplanting experiments supported the hypothesis of genetic control. As a rule the flushing habit of the various Aspen stands is associated with distinct morphological characteristics. A hypothesis is proposed to explain the origin and present distribution of prevernal Aspen colonies.

182. *Synecology, Plant Sociology: General, Principles and Methods*

254. Pédologie et phytosociologie. **[Pedology and plant sociology.]** [*Pap.*] *8th int. bot. Congr. Paris, Sect. 7* 1954 (33–42). [F. or G.] X.

Includes the following papers: Plant sociology and pedology (*G. Lemée*); and Plant associations and soil profiles (*R. Tüxen*).

182.1. Palaeoecology. History of Vegetation

See also Nos. 1259, 1262–3.

255. **Paleobotany. Session 3: various papers.** *Proc. 7th int. bot. Congr., Stockholm 1950*, 1953 (566–73). [E. or G.]

Papers (with discussion) by: *K. A. Chowdhury* on structure of cell wall in ancient and fossil woods; *W. W. Varossieau* on ancient buried and decayed wood [cf. *For. Abstr.* 12 (No. 393)]; *W. Müller-Stoll* on the identification of the wood of fossil dicotyledons; *E. Hofmann* on fossilized woods from upper Austria; and *N. W. Radforth* on palaeoecological research in N. Canada.

256. **Palynological conference. Session 1: pollen morphology and plant taxonomy.** *Proc. 7th int. bot. Congr., Stockholm 1950*, 1953 (873–81). [E., F. or G.]

Includes papers (with discussion) by: *J. Iversen* on identification of difficult pollen types by structural characters; *H. Straka* on researches on *Salix* pollen [cf. *For. Abstr.* 14 (No. 80)]; *M. van Campo-Duplan* on the pollens and phylogeny of the Coniferae [cf. *For. Abstr.* 12 (Nos. 978–82, 2708), 13 (No. 2772)].

257. Pjavčenko, N. I. O prirode nižnego maksimuma pylcy eli v torfjanikah. **[The nature of the lower Spruce pollen maximum in peat bogs [in central Russia].]** *Dokl. Akad. Nauk SSSR* 95 (5), 1954 (1093–6). 15 refs. [Russ.] A.P.B.

The Spruce and Larch pollen maximum in the older Holocene is taken to indicate a severe climate with residual permanently frozen soil at no great depth and 'islands' of forest in a forest-tundra landscape. In milder regions Pine was dominant. The Spruce phase presumably moved northward in the wake of the retreating glaciers, the Spruce pollen maximum being of differing age in different regions.

258. Sukačev, V. N., and Nedoseeva, A. K. O smene rastiteljnosti v tečenie rissvjurmskogo mežlednikovjja. **[The succession of vegetation during the Riss-Wurm interglacial period.]** *Dokl. Akad. Nauk SSSR* 94 (6), 1954 (1171–4). 14 refs. [Russ.] A.P.B.

Outlines the succession as revealed by analyses of pollen and other plant remains from interglacial deposits near Rostov, Yaroslavl district, viz.: (1) Spruce, (2) Pine, (3) Elm/Oak, (4) hardwoods/Spruce, (5) Pine/Spruce, (6) Spruce/Birch/Pine, and (7) Birch with scattered woods of Spruce and Pine. Inferences are made as to the corresponding climates.

259. Grayson, J. F. **Evidence of four Pine species from fossil pollen in Michigan.** *Ecology* 35 (3), 1954 (327–31). 13 refs.

Discusses the use of size-frequency for the determination of fossil species in the absence of morphological details permitting their identification.

260. Heusser, C. J. **Alpine Fir at Taku Glacier, Alaska with notes on its postglacial migration to the Territory.** *Bull. Torrey bot. Cl.* 81 (1), 1954 (83–6). 19 refs. O.B.D.

182.2. Succession, Alternation and Periodicity in Vegetation

See also Nos. 71, 197, 257–8, 260, 305–7, 315–6, 322–3, 366, 450, 453, 457–8, 760.

261. Dynamisme de la végétation, les climax, intérêt économique. **[Dynamic aspects of vegetation, climaxes, economic interests.]** [*Pap.*] *8th int. bot. Congr. Paris, Sect. 7* 1954 (87–106). [G.E.F.] X.

Includes the following papers: Static and dynamic considerations in phytosociological research work (*E. Aichinger*); Dynamic aspects of vegetation and the economics of the concept of climax (*P. Rey*); The value of microbiological tests in studying the dynamics of plant communities (*D. Lavergne*); Vegetation zones in Syria and the Lebanon (*P. Mouterde*); Forest ecology in the islands of the North Pacific (*M. Tatewaki*).

262. Corona, I. Un lariceto in Val Noana. **[A Larch stand in Val Noana.]** *Monti e Boschi* 5 (7), 1954 (323–7). 7 refs. [It.f.e.]

Examination of this stand of *Larix decidua* in the Dolomites leads to the conclusion that on many sites in the eastern Alps, Larch wood is a seral community, evolving towards a climax of *Picea abies* on the middle, and *Pinus mugo* on the upper mountain zones.

263. Kagis, I. **The story of a cut-over.** *For. Chron.* 30 (2), 1954 (158–82). 4 refs.

A considerable part of the *Picea glauca/Populus tremuloides* stands in Saskatchewan appear to be involved in a cyclic process. After a fire, where Aspen has established itself, the first wave of Spruce comes in; the second follows in about 50–70 years. When the Aspen thins out, the crest of the third wave comes, and the remaining Aspen, together with the Spruce of the first wave, begins to deteriorate. Cutting to diameter limits in such stands results in mortality from windthrow and dieback exceeding the increment of the residual Spruce. Spruce in these mixed stands responds to release even at the age of 100 years, crown quality being the decisive factor in such response. Insufficient regeneration of Spruce in the area examined appeared to be due to lack of seed, heavy sod, and invasion by shrub and weeds. *From author's summary.*

264. Buell, M. F., Buell, H. F., and Small, J. A. **Fire in the history of Mettler's woods.** *Bull. Torrey bot. Cl.* 81 (3), 1954 (253–5). 6 refs. O.B.D.

Examination of the growth rings of a fallen White Oak in woods of the Piedmont, New Jersey, showed scars caused by fire at roughly 10-year intervals for the first 84 years of its life. The tree probably began to grow in about 1627. This evidence corroborates reports of regular burnings by Indians, and indicates that the forests in this region may be a fire climax.

265. Lutz, H. J. **The effects of forest fires on the vegetation of interior Alaska.** *Sta. Pap. Alaska For. Res. Cent.* No. 1, 1953. pp. 36.

Contains sections on: geography, climate, forests and the history of forest fires in interior Alaska, the

effects of fires on different species, forest succession following fires, and effects of fires on soils, hydrologic relations, animal populations and the future economic development of Alaska. [Cf. *For. Abstr.* 13 (No. 2831).]

266. ADAM, J. Sur la végétation supportée par les sols hydromorphes noirs du bas fond de la réserve forestière de Bandia (Thiès) Sénégal. **[Vegetation supported by the black marshy soils of the depression in the Bandia forest reserve, Thiès, Senegal.]** *Bull. Soc. bot. France* 100 (7/9), 1953 (351–3). [F.] O.B.D.

A list of species colonizing the land after burning and a fallow period dating back to at least 1933.

267. TIWARI, S. D. N. **Teak the intruder vis-à-vis occurrence of Teak in Sal forests of Bastar.** *Indian For.* 80 (6), 1954 (332–7).

It is considered that Teak was introduced from the south at an early date. It appears to be gradually supplanting Sal (*Shorea robusta*) in the forests of this area.

182.4. Layer Communities

See also Nos. 276, 760.

268. BHARUCHA, F. R. **Tropical forests.** [*Pap.*] *8th int. bot. Congr. Paris, Sect. 7* 1954 (177–9). X.

Suggests that phytosociological studies of tropical forest should be based on the microclimate of the different forest storeys, with particular emphasis on the study of light intensity.

269. HOSOKAWA, T., OMURA, M., and NISHIHARA, Y. **Social unities of epiphyte communities in forests.** [*Pap.*] *8th int. bot. Congr. Paris, Sect. 8* 1954 (11–6). X.

Discusses terms used in the past to describe epiphyte communities and suggests and defines 3 new terms, viz. 'epies', 'epilia' and 'epido'.

270. OMURA, M., NISHIHARA, Y., and HOSOKAWA, T. **On the epiphyte communities in Beech forests of Mt. Hiko in Japan.** [*Pap.*] *8th int. bot. Congr. Paris, Sect. 16* 1954 (106–7). X.

271. HOSOKAWA, T. **On the vascular-epiphyte communities in tropical rainforests of Micronesia.** [*Pap.*] *8th int. bot. Congr. Paris, Sect.* 7 1954 (190–1). X.

272. PHILLIPS, E. A. **The value of bark bryophytes for testing phytosociological concepts and methods.** [*Pap.*] *8th int. bot. Congr. Paris, Sect. 16* 1954 (96–100). X.

273. PERTTULA, U. Metsäkasvien kukinta-ajoista ja niitten aiheuttamista värinäkymistä. **[On the blossoming periods and the colour aspects of forest flowers.]** *Commun. Inst. for. Fenn.* 40 (23), 1952. pp. 25. 11 refs. [Fi.e.]

A phenological study of ground flora.

182.5. Synecological Measurements and Methods

See also Nos. 782, 788.

274. GOODALL, D. W. **Minimal area: a new approach.** [*Pap.*] *8th int. bot. Congr. Paris, Sect.* 7 1954 (19–21). X.

275. HOPKINS, B. **A new method of determining the type of distribution of plant individuals. With an appendix by J. G. Skellam.** *Ann. Bot., Lond.* 18 (70), 1954 (213–27). 17 refs. O.R.E.

The method depends on linear measurements between random points and adjacent individuals, and between adjacent individuals. Its results compare favourably with those of current methods when tested on synthetic and natural populations. The method is quicker than the quadrat methods and is especially useful for analysing the distribution of trees. *Author's summary.*

276. WILDE, S. A. **Floristic analysis of ground cover vegetation by a rapid chain method.** *J. For.* 52 (7), 1954 (499–502). 11 refs.

Describes the line transect, analyses the quantitative units and discusses size and accuracy of sample, preferring this method to the quadrat, which can take 50 times as long and which, by failing to eliminate subjective judgments, sometimes leads to such arbitrary classifications as the *Oxalis-Myrtillus* type without *Oxalis*. Practical applications are enumerated, including its use as a measure of comparability for experimental plots, and for assessing site quality and productivity. [Cf. *For. Abstr.* 12 (No. 2758).]

277. BROWN, D. **Methods of surveying and measuring vegetation.** *Bull. Bur. Pastures Field Crops, Aberystwyth* No. 42, 1954. pp. xv + 223 + 30 photos. 14 pp. of refs. Price 35*s*.

Deals mainly with grassland, but also covers shrub/grassland and dense shrub. Part I deals with sampling, Part II with botanical analysis, Part III with productivity, Part IV with utilization.

278. Principes de représentation cartographique des groupements (1/1,000,000 and 1/200,000). **[Principles of mapping plant communities (1/1,000,000 and 1/200,000).]** [*Pap.*] *8th int. bot. Congr., Paris, Sect. 7* 1954 (107–24). [E. or F.] X.

Contains papers on work of importance in this field and methods used throughout the world. A review of work achieved is given by *A.-W. Küchler*, expositions of methods by *H. Gaussen* and *E. Schmid*, and notes on regional maps by *P. Ozenda* (Alpes-Maritimes), *C. G. G. J. van Steenis* (Malaysia) and *K. Hueck* (Argentina and Brazil).

187. *Vegetation Types*

See also Nos. 8–9, 30, 197, 208, 246, 340, 366, 434, 457–8, 760, 788, 1289, 1293–4.

279. ARCHARD, H. O., and BUELL, M. F. **Life-form spectra of four New Jersey Pitch Pine communities.** *Bull. Torrey bot. Cl.* 81 (3), 1954 (169–75). 15 refs. O.B.D.

280. WILDE, S. A., and LAFOND, A. M. **Soils and vegetation of the Great Lakes region of America.** [*Pap.*] *8th int. bot. Congr., Paris, Sect. 13* 1954 (81–90). X.

281. MERKLE, J. **An analysis of the Spruce-Fir community on the Kaibab Plateau, Arizona.** *Ecology* 35 (3), 1954 (316–22). 18 refs.

The study was made within the 8700–9200 ft. altitude range. The main forest species are *Picea engelmannii* and *Abies lasiocarpa*, but trees of the montane forest below are relatively abundant. The

great abundance of *Populus tremuloides* is attributed to extensive fires of the past 200 years and the low cover value of the other species.

282. **Forest botany. Session 1: forest types.** *Proc. 7th int. bot. Congr., Stockholm 1950*, 1953 (289–94). [F. or G.]

Includes papers (with discussion) by: *H. Gaussen* on forests of the French Pyrenees [cf. *For. Abstr.* 12 (No. 34)]; *R. Tüxen* on forest ecological mapping in Germany; *V. Kujala* on the geographical distribution of forest types.

283. GORHAM, E. **The soils and vegetation of a western Irish relict woodland.** *J. Ecol.* 42 (2), 1954 (497–504). 16 refs.

Deals mainly with soil reaction and ground flora of a mixed hardwood stand, believed to be a relict of primeval vegetation. The most noteworthy feature is the relatively low acidity of the deepest and most organic mor accumulations, pH being generally above 4·5.

284. ANDERSON, M. L. **The ecological status of Wistman's Wood, Devonshire.** *Trans. bot. Soc. Edinb.* 36 (3), 1952/53 (1954), (195–206 + plate). O.B.D.

Discusses the history and status of this woodland, which some ecologists consider to be a relict of primitive forest. The author puts forward a theory that Pedunculate Oak now growing there is not a survival of the primitive forest, but has been introduced by birds from neighbouring districts.

285. SCAMONI, A. Über lerchenspornreiche Waldgesellschaften im Bereich des Diluviums der DDR. [***Corydalis* forest associations in the diluvial regions of E. Germany.**] *Arch. Forstw.* 2 (2/3), 1953 (232–44). 10 refs. [G.]

Three species of *Corydalis* are, on account of their relatively peculiar requirements, good site indicators, whether in combination with one another or with other species of their communities. *Corydalis cava*, apart from its occurrence in alluvial forest on loess is to be found on loams influenced by groundwater and on the better sands in a *Corydalis* type of Beech/Pedunculate Oak/Ash forest (*a*), always on gentler slopes in more fertile soils. *C. intermedia* occurs also in this *Corydalis* type but occupies also steep ground-moraine slopes of similar high fertility in so-called Oak/Hornbeam/Lime forests (*b*). *C. pumila* as a sub-continental species is only an intruder, and in environment (*b*) demands sub-continental conditions created by the macro-, local, or micro-climate. Additional recommendations for (*a*) are Sycamore Maple, Field Elm, Hornbeam, Poplar, Japanese Birch and, where groundwater is not too high, Douglas Fir (though attacked by *Phaeocryptopus gaeumannii* here). Further protection from erosion is desirable with high forest of the species natural to the association. Association tables are given and the position of these communities in the *Querceto-carpinetum* is discussed.

286. PASSARGE, H. Waldgesellschaften des mitteldeutschen Trockengebietes. 1. Fortsetzung B. Die Traubeneichen-Buchenwälder des Berghügellandes. (*Querceto-Luzuletum nemorosae.*) **[Forest associations of the central German dry region. 1. B. The Sessile Oak/Beech forest of the montane hill lands. (*Querceto-Luzuletum nemorosae*).]** *Arch. Forstw.* 2 (2/3), 1953 (182–208). [G.g.]

[Cf. *For. Abstr.* 15 (No. 2362).] In contrast to the Oak/Hornbeam, the Oak/Birch forests both of the hills and of the plains cannot be simply classified on common floristic characters. The sub-association groups show great floristic independence, with only a few characteristic species to indicate the affinities of their sub-units. The Oak/Beech and Oak/Birch have almost the same common indicators, the differentiating species being no more marked than those that differentiate for instance the Sessile Oak/Birch of the hills and the dry Oak/Birch of the plains. The Oak/Beech forests should be considered as geographical climatic variants of the Oak/Birch. Within the species-poor mixed Oak forest (*Quercetalia roboris-petraeae*) it appears advisable, in order to give this climatically conditioned unit its due weight, to set up beside the Oak/Birch (*Querceto-Betuletum*) association group, another, the Oak/Beech (*Querceto-Luzuletum*). Association tables show the systematic positions and interrelation of these units. *From author's summary.*

287. PASSARGE, H. Waldgesellschaften des mitteldeutschen Trockengebietes. 2. Die Eschen-Feldulmenwälder (Verband: *Alneto-Ulmion*). **[Forest associations of the central German dry region. 2. The Ash/Field-Elm forests (*Alneto-Ulmion* alliance).]** *Arch. Forstw.* 2 (4/5), 1953 (340–83). 2 refs. [G.]

Divides the *Alneto-Ulmion* into (*a*) true *Auwald*, (*b*) bottomland forests with high water-table and (*c*) *Aubruch*. (*a*) is here defined as floodland forest (Elbe basin) on mainly clayey soils built up by deposition and still subject to flooding. Its association group, the *Fraxino-Ulmetum* (Ash/Field Elm/Pedunculate Oak) is divided into two sub-association groups: (1) of the hill reaches, characterized by *Corydalis cava* and (2) of the plains reaches, by *Acer campestris*. Each of these has a typical sub-association and a Hornbeam-containing variant, the first named the *Polygonatum multiflorum* and the second, the *Carpinus betulus* sub-association. The Ash/Field-Elm forests (*Sambuceto-Ulmetum*) of (*b*), on groundwater-influenced, loamy, humic, loess soils, also contain Pedunculate Oak in the main mixture. They are similarly divided into (1) a sub-association group of the hill reaches, named the *Aegopodium podagraria* and (2) the *Oxalis stricta* of the plains reaches. The first of these is again divided into a normal sub-association (*typicum*) and a Hornbeam variant (*Carpinus betulus*). The *Oxalis* group (2) has one sub-association (the *Tilia cordata*). (*c*) consists of Alder/Elm forest, *Alneto-Ulmetum*, on wet ground with Ash as a main constituent: sub-associations of *Q. robur* and *Carex acutifolium* are described. Association tables are given and their relation with classifications by other authors discussed. Photographs illustrate soil profiles, vegetation and the root habits of Pedunculate Oak, Field Elm, and Ash in the soils of (*a*) and (*b*), of Norway Maple and Hornbeam in (*b*) and of Poplar in (*a*). Silvicultural measures are recommended separately for (*a*)/(*b*) and (*c*), with special consideration of the soil exploitation shown by the root habit of the

various species. With (*a*)/(*b*) great edaphic variations have to be considered. Clear felling, monoculture and the use of conifers and Beech are out of the question. A multi-storeyed forest of Oak, Elm, Ash, with Sycamore Maple, Norway Maple and Wych Elm and accessory species which protect the soil and suppress grass is indicated. Possibilities occur for Poplar, Hickory and Red Oak. With regard to Elm disease recent advice is accepted that the species is safe enough if treated properly. The choice of species for (*c*) is even more restricted owing to the very high water-table. Ash and Alder (peeler logs) in mixed selection stands, with accessory species, should be maintained for full water use. Poplar, *Salix alba* and *S. fragilis* are also suggested. If the first is used in pure stands it should be early underplanted with Alder, Ash, Elm, and Bird Cherry.

288. PASSARGE, H. Waldgesellschaften des mitteldeutschen Trockengebietes (3, Fortstzung und Schluss). **[Forest associations of the central German dry region. Part 3 and conclusion.]** *Arch. Forstw.* 2 (6), 1953 (532–51). 40 refs. [G.]

The Hornbeam/Field Elm (*Carpino-Ulmetum* subassociation group of *Ulmus carpinifolia*) occurs on slopes (below 200 m., the upper limit of the Elm) where the re-entrants widen and the site becomes warmer and drier than in the narrow forests above. The Mountain Elm and the large-leafed Lime are replaced by the Field Elm and *Tilia cordata*, the proportion of Sycamore Maple and Ash is reduced and Oak and Hornbeam replace Beech (and Silver Fir). Three sub-associations are described, the normal one characterized by *Lamium galeobdolon* and another by *Acer campestre*. The main function of these forests is to protect soil and provide side shelter; timber is only a by-product. New planting and replacement should be confined to natural species. In general summary the 'concentration values' [Braun Blanquet: Pflanzensoziologie, 1951 (p. 109)] of the characteristic plants of the 11 main forest associations of the central German dry region are presented in a table to show their natural grouping into (*a*) 3 Oak/Birch and one Sessile Oak/Beech type, (*b*) 3 Oak/Hornbeam and one Hornbeam/Elm type and (*c*) a repetition of the last (overlap), floodland-Elm, Ash/Elm and Alder/Elm. The present composition and distribution of these forests is discussed in relation to pollen analysis, climatic changes and treatment within historic times.

289. MURANSKÝ, S. Přirozená společenstva středočeských chlumů. **[The natural plant communities of the Central Bohemian hills.]** *Lesn. Knihovna* (*velká Řada*) No. 1, 1950. pp. 141. 84 refs. [Cz.cz.] Price *Kčs.*90.

Cf. *For. Abstr.* 12 (No. 154).

290. MEDWECKA-KORNAS, A. Analyse de la limite entre deux étages altitudinaux de la végétation forestière (basée sur les données provenant d'une partie des Carpathes occidentales polonaises). **[Analysis of the limit between two altitudinal stages of forest vegetation (based on data from part of the western Polish Carpathians).]** [*Pap.*] *8th int. bot. Congr., Paris, Sect. 7* 1954 (62–3). [F.] X.

291. KORNAS, J. Sur les relations entre la distribution verticale des espèces et des associations végétales dans les montagnes (d'après des recherches dans la chaîne de Gorce—Carpathes occidentales polonaises). **[The relationship between the vertical distribution of species and that of plant associations in montane sites (according to researches in the Gorce range—western Polish Carpathians).]** [*Pap.*] *8th int. bot. Congr., Paris, Sect. 7* 1954 (64–6). [F.] X.

292. BARTOLI, C. Sur les peuplements de pins à crochets de la Haute-Maurienne. **[Populations of *Pinus mugo* var. *rostrata* in the Haute-Maurienne.]** [*Pap.*] *8th int. bot. Congr., Paris, Sect. 13* 1954 (45–7). [F.] X.

Describes briefly some types of vegetation associated with *P. mugo* var. *rostrata* in this region of Savoy.

293. GUINIER, P. Le taillis thermophile de chêne pubescent. **[The thermophile coppice stands of *Quercus pubescens* [on calcareous soils in Savoy].]** *Bull. Com. For., Paris* 14 (86), 1953 (1591–9). [F.]

Describes the vegetation of this widespread type, which is dominated by *Q. pubescens* but contains many other broadleaved trees and shrubs. It is thermophile rather than xerophile, and suggestions are made for enriching these now economically unremunerative stands by planting *Cedrus atlantica*, *Abies cephalonica*, *A. pinsapo*, and *A. nordmanniana*.

294. MOLINIER, R. Sur la nature et la signification de divers bois de pins dans le Sud-est de la France. **[The character and significance of various Pine forests in south-eastern France.]** [*Pap.*] *8th int. bot. Congr., Paris, Sect. 13* 1954 (35–8). [F.] X.

Cites some types of association found in this region and their possibilities for the regeneration (both natural and artificial) of *Pinus halepensis*, *P. sylvestris* and *P. nigra* var. *austriaca*.

295. BOLÒS, O. DE. Les étages altitudinaux dans la partie septentrionale des chaînes littorales catalanes. **[Altitudinal stages in the northern part of the Catalan coastal ranges.]** [*Pap.*] *8th int. bot. Congr., Paris, Sect. 7* 1954 (53–4). [F.] X.

The following stages are distinguishable: (1) *Quercetum ilicis galloprovinciale*, (2) *Quercetum mediterraneo-montanum*, (3) *Quercion pubescentisessiliflorae*, (4) *Fagion*, and (5) *Juniperion nanae*.

296. KALELA, A. Kainuun alueen metsätyypeistä. **[The forest types of the Kainuu district between central and northern Finland.]** *Commun. Inst. for. Fenn.* 40 (26), 1952. pp. 17. 11 refs. [Fi.g.]

297. MIKOLA, P. Havumetsien viimeaikaisesta kehityksestä metsänrajaseudulla. **[On the recent development of coniferous forests in the timberline region of northern Finland.]** *Commun. Inst. for. Fenn.* 40 (2), 1952. pp. 35. 56 refs. [Fi.e.]

Climatic conditions are now such that Pine reproduction occurs in favourable years and it is concluded that much of the Birch scrub that lies north of the present coniferous tree line could be replaced by Pine forest.

298. MALMSTRÖM, C., and TAMM, O. Les principaux groupements végétaux des forêts de Suède et leurs types de sol correspondants. **[The principal plant communities of the Swedish forests and their corresponding soil types.]** [*Pap.*] *8th int. bot. Congr. Paris, Sect. 13* 1954 (65–73). [F.] X.

299. KUOCH, R. Wälder der Schweizer Alpen im Verbreitungsgebiet der Weisstanne. [I.]. **[Forest types of the Swiss Alps within the natural range of *Abies alba*.** [I.]] *Mitt. schweiz. Anst. forstl. Versuchsw*, 30, 1954 (133–260 + 12 photos + 17 tbls.) 136 refs. [G.g.f.]

The plant sociology of the natural forests of the Swiss Alps within the natural range of Silver Fir was studied exhaustively on the basis of 644 vegetation surveys, and 15 associations, comprising more than 30 sub-associations and variants are described and their distribution discussed. Among the conclusions reached are the following. Forests with a high proportion of Fir should be classified under the *Fagion*, which thus includes some associations containing little or no Beech; an exception is the *Rhododendro-Abietetum* which is placed in the *Vaccinio-Piceetalia*. All natural Spruce stands should be grouped in a special alliance—the *Piceion*. The most widespread forest types (the climax associations) lack single, generally valid, characteristic species, and the combination of constant species, which is unique for each type, is therefore of the greatest importance for determining the most frequent forest types. A preliminary effort is made to assign to each natural forest type its corresponding site type [see further in next abstract]. The description of each association is accompanied by a section on silvicultural treatment, and among the many tables are some showing for each forest tree species the associations in which it is found. From this it is clear that each species has a particular sociological and silvicultural rôle and that for any one species this rôle may differ from one association to another. The great difference in the requirements and behaviour of Silver Fir and Spruce is emphasized.

300. BACH, R., KUOCH, R., and IBERG, R. Wälder der Schweizer Alpen im Verbreitungsgebiet der Weisstanne. II. Entscheidende Standortsfaktoren und Böden. **[Forest types of the Swiss Alps within the natural range of *Abies alba*. II. Limiting site factors and soils.]** *Mitt. schweiz. Anst. forstl. Versuchsw.* 30, 1954 (261–314). 23 refs. [G.g.f.]

The authors, from a study of soil profiles, assign to the plant associations described by R. Kuoch [cf. preceding abstract] their proper soil types and topographical sites and climates. The data available were limited, but some general conclusions are drawn, and lines for future research sketched.

301. RICHARD, J. L. Application de la phytosociologie à la reconstitution des forêts dévastées dans le Jura suisse. **[Application of plant ecology to the reconstitution of the degraded forests of the Swiss Jura.]** [*Pap.*] *8th int. bot. Congr., Paris, Sect. 7* 1954 (22–3). [F.] X.

Two types of vegetation can be distinguished in the Swiss Jura: (1) *Fagetum luzuletosum*, and (2) *Cariceto-Fagetum*. A study of these communities, and particularly of edaphic factors, is invaluable in reforestation. Silver Fir, one of the constituents of (1), thrives better there than in (2). Other conifers (Larch and Scots Pine) and Oak may profitably be included in (1). Scots Pine and thermophilic deciduous species adapted to calcareous soils are recommended for (2).

302. WRABER, M. Aperçu des principaux groupements de végétation forestière de la Slovénie. **[The principal forest communities of Slovenia.]** [*Pap.*] *8th int. bot. Congr., Paris, Sect. 7* 1954 (57–60). [F.] X.

A classification under 4 main heads: (1) *Vaccinio-Piceeta*, (2) *Querceta roboris-sessiliflorae*, (3) *Quercetofageta* and (4) *Alneta glutinosae*.

303. GLIŠIĆ, M. Prilog poznavanju fitocenoza pitomog kestena i bukve u Bosni. **[The community *Castaneto-Fagetum* in Bosnia.]** *Šumarstvo* 7 (3), 1954 (162–74). 15 refs. [Serb.f.g.]

Besides *Querceto - Castanetum croaticum* and *Querceto-Castanetum montenegrinum* in Croatia and Montenegro respectively, *Castanea sativa* was found by the author to form in Bosnia the community *Castaneto-Fagetum croaticum*, which is described in detail. [Cf. *For. Abstr.* 16 (No. 187).]

304. GAJIĆ, M. Pregled šumskih fitocenoza Šumadije. **[Survey of the forest communities of Sumadija [the forest region of Serbia].]** *Šumarstvo* 7 (6), 1954 (360–4). 6 refs. [Croat.]

Describes the following communities: *Querceto-Fraxinetum serbicum mixtum*, *Querceto-Carpinetum serbicum*, *Fagetum montanum serbicum*, *Quercetum montanum*, *Quercetum confertae-cerris serbicum*, *Quercus pubescens-Fraxinus ornus*, and *Carpinetum orientalis serbicum*.

305. PATAKY, L. Prilog proučavanju bosanskih šikara. **[The '*šikara*' [deciduous scrub woodland] of Bosnia.]** [*Publ.*] *Inst. nauč. šum. Istraž., Sarajevo* 2 (5), 1953. pp. 29 + 8 photos + 1 map. 10 refs. [Serb.f.g.]

The author gives reasons for his view that both the deciduous scrub woodland ('*šikara*') and deciduous shrub formation ('*šibljak*') of Bosnia are secondary formations, though some scrub in the Karst region of Herzegovina may be primary. Both types are said to be the devastated remnants of former high forests. He suggests the following practical classification of stands other than high forest: *šibljak*, typical *šikara* and *šikara* in which tree species are redeveloping, degraded coppice forest, young and adult coppice forest. Out of ca. 1,500,000 ha. under woodland and forest in Bosnia, almost exactly ¼ is covered by *šibljak* and *šikara*.

306. JOVANOVIĆ, B. Šibljak-associjacija *Artemisieto-amygdaletum nanae* na Rtnju. **[The association *Artemisieto-amygdaletum nanae* of the *šibljak* [warm-temperate deciduous shrub formation] on Mt. Rtanj in E. Serbia.]** *Šumarstvo* 7 (6), 1954 (337–48). 23 refs. [Serb.f.g.]

307. GIMINGHAM, C. H., and WALTON, K. **Environment and the structure of scrub communities of the limestone plateaux of Northern Cyrenaica.** *J. Ecol.* 42 (2), 1954 (505–20 + 8 photos). 17 refs.

Evidence is presented for regarding the scrub communities as degradation products of the 'forest' climax (*Cupressus sempervirens, Juniperus phoenicea, Olea europaea, Quercus coccifera, Ceratonia siliqua,* and *Pinus halepensis*), of which remnants still occur. It is suggested that the main factor causing degradation is grazing, leading to exposure and erosion of the shallow soil.

308. Regel, C. Phytogeógraphie de l'Iraq. **[Plant geography of Iraq.]** [*Pap.*] *8th int. bot. Congr., Paris, Sect. 7* 1954 (51–2). [F.] X.

Includes brief notes on the forests.

309. Problèmes phytogéographiques en pays tropicaux. **[Problems of plant geography in tropical countries.]** [*Pap.*] *8th int. bot. Congr., Paris, Sect. 7* 1954 (75–86). [F. or E.] X.

Includes the following papers: Climatic and edaphic plant formations of Brazil (*I. T. Luis*); Outline of vegetation types in Colombia (*J. Cuatrecasas*); Phytogeography in the Caribbean area (*C. F. Asprey*); The ecology of the coastal vegetation of the Gold Coast (*A. S. Boughey*).

310. **Phytogeography. Session 1: tropical flora and vegetation.** *Proc. 7th int. bot. Congr., Stockholm 1950*, 1953 (602–10). [E., F. or G.]

Papers (with discussion) by: *C. Troll* on comparison of the tropical flora of the Old and New World; *P. W. Richards* on the structure of tropical evergreen forest in America, Asia, and Australia [cf. *For. Abstr.* 14 (No. 211)]; *W. Robyns* on the phytogeographic elements in the Congo flora [cf. *For. Abstr.* 12 (No. 163)]; *O. Hedberg* on vegetation belts of the E. African mountains [cf. *For. Abstr.* 13 (No. 1071)].

311. Eeckhout, L. E. Contribution à l'uniformisation de la terminologie phytogéographique. **[The standardization of terminology in plant geography.]** [*Pap.*] *8th int. bot. Congr., Paris, Sect. 7* 1954 (69–74). [F.] X.

Presents a list of terms (in French) necessary for a description of the vegetation of the Congo, with English, German and Dutch equivalents, and a classification by regions of the physiognomic types of vegetation of the Belgian Congo.

312. Stehlé, H. Correlations entre les formations sylvatiques intertropicales africaines, antillaises et américaines. **[Correspondences between the tropical forest formations of Africa, the Antilles and America.]** [*Pap.*] *8th int. bot. Congr., Paris, Sect. 7* 1954 (192–3). [F.] X.

Presents a series of lists showing equivalent terms for the forest types of Schimper (1903), Barbour (1942), Schantz and Marbut (1924) and Beard (1944) and those for the forest types of the Caribbean. [Cf. *For. Abstr.* 8 (No. 942).]

313. **The chief vegetation types of the Sudan.** *Rep. For. Dep. Sudan 1952/53*, 1954 (50–4).

A simplified summary of the principal types and the areas occupied by each of them.

314. Jaeger, P. Sur la position phytogéographique du Loma (Sierra-Leone) dans le cadre montagneux ouest-africain. **[The plant geographical position of the Loma range in the mountain vegetation pattern of West Africa.]** [*Pap.*] *8th int. bot. Congr., Paris, Sect. 7* 1954 (48–51). [F.] X.

315. Jones, E. W. **The status of a Nigerian rain forest.** [*Pap.*] *8th int. bot. Congr., Paris, Sect. 13* 1954 (62–4). X.

A study in a typical compartment of the Okomu Forest Reserve showed that about half the area carried 'closed high forest', with continuous, well-developed lower and middle storeys and numerous emergents. The remainder consisted of patches of various degradation stages, with a few isolated emergents. Members of the middle and lower storey, which are shade-tolerant, are regenerating adequately, but the indications are that regeneration of the more light-demanding emergents is not sufficient to maintain a forest as rich in emergents as the existing 'closed high forest'. It is possible that the 'closed high forest' of Okomu represents an old secondary forest which is degenerating, the scrub representing phases in the reversion to a forest of shade-tolerant trees, with a relatively small proportion of light-demanding emergents. In these respects the Okomu Reserve may be typical of most of the forest of Benin Province. [Cf. *For. Abstr.* 12 (No. 257).]

316. Ross, R. **Ecological studies on the rain forest of Southern Nigeria. III. Secondary succession in the Shasha forest reserve.** *J. Ecol.* 42 (2), 1954 (259–82 + 10 photos). 4 refs.

Deals with the results of the Cambridge Botanical Expedition to Nigeria (1935). The two previous papers were published in 1939 [cf. *For. Abstr.* 1 (pp. 82, 146)]. The secondary succession after the cessation of cultivation in a primary-rain-forest area of southern Nigeria was examined. The course of the succession was studied chiefly by means of sample plots, the plants on which were listed. These were taken in areas 5, 14 and 17 years after previous cultivation. The woody species on these plots could be divided into those characteristic of primary forest and those characteristic of secondary forest. A rise in the number both of species and individuals of the former class with increase of age of the plot was found. The dominant species in the first 15 years or so of the succession was *Musanga cecropioides.* It died out at this age and there was no single dominant in any later stage. The following environmental factors were studied: CO_2 concentration, light, temperature and humidity. The results obtained are compared with those obtained by Evans (1939) in the primary forest of the vicinity. Soil samples were taken on the 5- and 14-year-old plots and descriptions of the soil profiles in the two cases are given. Results of analyses made on the latter soil are also given. It is concluded that in the area concerned, primary forest will become re-established on land abandoned after cultivation. This, however, may not hold for more densely inhabited and more closely cultivated areas in the rain-forest zone. *From author's summary.*

317. **Land, water and vegetation type areas, Tanganyika.** *Rep. For. Dep. Tanganyika 1953*, 1954 (63).

Gives the distribution of the vegetation types by area in sq. miles of dry land, for each of the 8

[political] provinces [from Gillman's vegetation map].

318. FANSHAWE, D. B. **Riparian vegetation in British Guiana.** *J. Ecol.* 42 (2), 1954 (289–95). 10 refs.

Riparian vegetation in British Guiana is classified into swamp forest, swamp woodland, arborescent woodland, herbaceous swamp, semi-aquatic swamp, and aquatic swamp. The vegetation of the different types is described in broad detail.

319. PIRES, J. MURÇA, DOBZHANSKY, T., and BLACK, G. A. **An estimate of the number of species of trees in an Amazonian forest community.** *Bot. Gaz.* 114 (4), 1953 (467–77). 5 refs. O.B.D.

Counts on a plot of 3·5 ha. in virgin forest on firm ground near Castanhal, Pará, Brazil, showed 1482 trees of 10 cm. or more in diameter belonging to 179 different species. Comparison of the species composition of the sample with that of a plot some 20 km. away [cf. *For. Abstr.* 12 (No. 2533)] shows considerable difference. The number of species in the different facies of the firm-ground association in Amazonia may be much larger than that found in the samples studied so far. *From authors' summary.*

320. GUIMARAES-FERRI, M. **Water-balance of the 'Caatinga', a semi-arid type of vegetation of northern Brazil.** [*Pap.*] *8th int. bot. Congr., Paris, Sect.* 7 1954 (221–3). X.

The deciduous nature of the Brazilian *caatinga* is due to lack of water during the dry season. Observations are presented on the *caatinga* of Paulo Afonso (Bahia State), a region of very low rainfall (seldom $>$ 500 mm. annually) and on the water régime of the species adapted to these conditions.

321. LANJOUW, J. **The vegetation and the origin of the Suriname savannas.** [*Pap.*] *8th Int. bot. Congr., Paris, Sect. 7* 1954 (45–8). X.

In practically the whole of Suriname the savannas can be regarded as belonging to a single association. Three types are distinguished (1) flat catchment, (2) impermeable clay layer and (3) leached-soil-and-impermeable-ironpan. They owe their origin, not to climate but to the soil structure, soil leaching or to insufficient water supply.

322. WALTER, H. Das Savannenproblem und die Gefahr der Verbuschung. [**The problem of savanna and the danger of bush encroachment.**] [*Pap.*] *8th int. bot. Congr., Paris, Sect.* 7 1954 (185–7). [G.f.] X.

Natural savanna in areas with high rainfall forms an equilibrium between herbaceous and woody plants, in which the herbaceous plants predominate, the woody plants being limited by a lack of available soil moisture. If the savanna is overgrazed, growth of woody species is encouraged and the savanna may be transformed into bush.

323. SZECHOWYCZ, R. W. **Some observations on climate, soil, and forest climax [in Ceylon].** *Ceylon Forester (n.s.)* 1 (4), 1954 (131–40). 16 refs.

Reviews the controversy on the status of vegetation types (particularly grassland) in Ceylon in the light of the literature and the author's own observations.

324. PAPY, H. R. Étude sur la végétation des îles de la Société et de Makatea (Océanie française). [**A study on the vegetation of the Society Islands and Makatea (French Oceania).**] *Année Biologique, Paris* 29 (11/12), 1953 (539–42). 2 refs. [F.] O.R.S.

325. BEADLE, N. C. W. **Soil phosphate and the delimitation of plant communities in eastern Australia.** *Ecology* 35 (3), 1954 (370–5). 13 refs.

The predominant vegetation type in the Sydney district is a sclerophyllous forest dominated by species of *Eucalyptus*; two subformations are recognized, the wet and the dry sclerophyll forests. There are also small areas of subtropical rain forest. The data obtained in the present study indicate that soil fertility is primarily responsible for the delimitation of the various plant communities, and that soil P is the factor which determines the vegetation, with the possible exception of some of the small patches of rain forest, which may be climatically controlled. It appears that each species has a minimum requirement for normal growth, and if this requirement is fulfilled, the plant survives in the area provided that it can compete with other species. Plants with low mineral requirements appear to be excluded from the more fertile soils because of their inability to compete with the more vigorous species native to these soils. Soil N, though often low, is never a limiting factor. Data are given on the % ash and PO_4 in oven-dry leaves of various species from different communities, and weight of flax plants grown in soils supporting different communities.

2. SILVICULTURE

See also Nos. 185, 189–94, 299.

326. OSTROM, C. E., and HEIBERG, S. O. **Large scale tests in silvicultural research.** *J. For.* 52 (8), 1954 (563–7). 2 refs.

A report of the committee on technical procedures and standards for silvicultural research of the Society of American Foresters on the scope, types, lay-out, application of treatments, recording and interpretation of results of large-scale tests with plots of 10–100 or more acres.

327. KRAHL-URBAN, J. Lärchen. Eine forst- und holzwirtschaftliche Betrachtung. [**Larch. Tree and wood.**] *Holz-Zbl.* 80 (77; 80), 1954 (939–40; 973–5). 10 refs. [G.]

Discusses Larches in Germany, their silvicultural and economic value, and properties and uses of their wood, concluding with silvicultural recommendations.

328. MÉTRO, A. Note sur la sylviculture appliquée aux forêts de chênes-lièges au Maroc. [**Note on the silviculture of *Quercus suber* forests in [French] Morocco.**] [*Docum.*] *4th Sess. FAO Jt.*

Subcomm Medit. For. Probl. No. *FAO/CEF/SCM/49-A*. 1954. pp. 5. [F.]

329. VINCENT, G., and ŠPALEK, V. Topoly: jejich pěstování a dřevní produkce. **[Poplars: their silviculture, wood properties and yield.]** *Lesn. Knihovna (malá Řada)* No. 35, 1954. pp. 209 + 3 tbls. + 1 map. 7 pp. of refs. [Cz.]

A reference manual for Czechoslovakian conditions, with chapters on: taxonomy (brief descriptions of the sections of the genus, followed by descriptions of the species, varieties and hybrids in alphabetical order); choice of species (general notes, followed by notes on the silvicultural characters and natural range of all the more important species etc.); propagation (choice of method; propagation from seed, cuttings, root cuttings and suckers); selection and breeding; planting and tending (choice of site; forest plantations; plantations outside the forest); wood properties (sp. gr., anatomical features, chemistry, and other properties); and a review of volume and yield tables. Appendixes contain tables for identification, yield and volume tables taken from other works, and a map of the growth regions of Czechoslovakia.

22. SILVICULTURAL SYSTEMS. CONSTITUTION AND COMPOSITION OF STANDS; FORMS OF STAND

221. *High Forest Systems*

See also Nos. 763, 768, 776, 1295.

330. **[Tropical shelterwood system.]** *Rep. For. Dep. West. Reg. Nigeria 1953*, 1954 (11–2).

Contains proposals for considerable simplification of the tropical shelterwood system, in which the present number of operations is considered, on the grounds of labour supply and cost, to be quite impracticable. Climber cutting, hitherto regarded as merely easing access, is now recognized as an important means of inducing regeneration.

331. LANCASTER, P. C. ***Khaya ivorensis* regeneration—interim observations.** *Inform. Bull. For. Dep. Nigeria* No. 19, 1954 (1–6).

First-year survival and growth of natural regeneration and sowings of this species give the impression that line sowings may prove the best practice in stands under the tropical shelterwood system.

332. HOUGH, A. F. **Growth response in Allegheny hardwood forests after diameter-limit pulpwood cuttings.** *Sta. Pap. Ntheast. For. Exp. Sta.* No. 68, 1954. pp. 18. 10 refs.

A study of plots cut to 5-in., 8-in. and 11-in. diameter limits in the 10 years after felling indicates that the average time to replace the basal area or volume removed will be 34, 25 and 15 years respectively. Selection of a high diameter limit is therefore recommended.

222. *Coppice, Pollarding and Lopping Systems*

See No. 453.

226. *Changes of Silvicultural System. Conversion (by System or Species)*

See also No. 293.

333. TURNER, G. Transformation des pessières en peuplements mélangés. **[Conversion of pure Spruce to mixtures.]** *Bull. Com. For., Paris* 14 (84), 1951 (1405–9). [F.]

Briefly describes the technique employed during the past 25 years for the conversion of pure even-aged Spruce stands in the Ardennes to mixtures (60% Spruce, 20% Beech, and 20% Silver Fir). Conversion is carried out on openings of ca. 10 ares (36 m. diam.) each made by successive regeneration fellings progressing from NNE. to SSW. The duration of the conversion operations varies with the number of openings/ha., the intensity of marking, and the success of plantings and natural regeneration, but a minimum of 20 and a maximum of 40 years is envisaged. Details are given of the number and arrangement of openings, the nature of the successive fellings, and the planting of the mixture species, an adaptation of the group method advocated by M. L. Anderson [cf. *For. Abstr.* 13 (No. 2091)].

228. *Constitution and Composition of Stands; Choice of Species and Form of Mixture; Tree Classes; Forms of Stand*

See also Nos. 285–8, 301, 434, 760, 771, 781.

334. RÜHL. Über die Zweckmässigkeit des Anbaues der Fichte in norddeutschen Mittelgebirgen. **[The advisability of growing Spruce in the North German highlands.]** *Forst- u. Holzw.* 9*A* (12), 1954 (250–1). 8 refs. [G.]

Notes on Spruce stands on various sites in this region, where the species thrives well, even on poor soils. It should not, however, be used for afforestation to the complete exclusion of native species.

335. ILVESSALO, Y. Metsikkölajien esiintyminen Suomen metsissä. **[Occurrence of different kinds of forest stand in Finland.]** *Commun. Inst. for. Fenn.* 39 (2), 1951 (1952). pp. 27. [Fi.e.]

Analysis of data from the Finnish national surveys shows that pure Pine stands (with a maximum admixture of 15%) are the most frequent type in Finland, but that mixtures of various kinds together form a majority of the forest area. It is urged that more study should be devoted to mixed stands.

336. KARLBERG, S. Om björken i Norrbotten och dess behandling. **[Birch in Norrbotten and its treatment.]** *Norrlands SkogsvFörb. Tidskr.* 1954 (2), (201–32). 53 refs. [Sw.]

Compares yield data for Pine and Birch, gives figures showing the distance that Birch pulpwood can economically be carried by road and rail for processing, and discusses the soil-improving properties of Birch. In even-aged Pine/Birch stands, Pine grows well and the Birch can be left, though preference will naturally be given to Pine in cleaning and thinning. Where Birch is older, Pine does poorly except in gaps in the Birch, and Birch must be reduced in many young pole stands if the Pine is to develop satisfactorily. Costs of different methods of

applying arboricides (e.g. spraying on foot, from a tractor, or from the air) are compared. In clearing the extensive areas of poor Birch for natural regeneration the cheapest method of removing the Birch can be used. In clearing an even-aged stand, it can be cut normally without the danger of sprouts overtopping the Pine if the latter is at least 1 m. high. If the Birch forms an overstorey, chemical treatment is preferable. Experiments in 1953 showed that sprouting from Birch stumps is as extensive in closed Pine stands as in the open, but that in fairly dense Pine thickets the sprouts die back through lack of light; at the pole stage, treatment with growth-regulators may be desirable. Experiments on the effect of burning in a cleared area shows that this is likely to reduce sprouting from the stumps but not necessarily to reduce Birch seedling regeneration.

23. REGENERATION AND FORMATION OF STANDS

See also Nos. 1268 *et seq.*

337. ANDRADE, E. NAVARRO DE. Instrucciones para el cultivo del eucalipto. **[Instructions for the cultivation of Eucalypts.]** *Publ. misc. Minist. Agric. Argent.* No. 384, 1954. pp. 48. [Span.]

A translation from the Portuguese presenting information based on the work of the Compañia Paulista and including some growth data.

338. SWABEY, C. **Silviculture of Musizi (*Maesopsis eminii*).** *Tech. Note For. Dep. Uganda* No. 10/54, 1954. pp. 3.

Notes on trials in natural and artificial regeneration of this species in Uganda.

339. BERNARD, F. Rapport sur certaines questions de sylviculture au Gabon. **[Report on certain aspects of silviculture in the [French] Gaboon.]** [*Proc.*] *1st Conf. for. interafric., Abidjan 1951*, 1952 (353–8). [F.e.]

About 600,000 cu.m. of Okoumé (*Aucoumea klaineana*) compared with 30,000 of other species were exploited in 1950 in this territory. The regeneration of the latter is left to nature and only for Okoumé are the following special methods used. Strips 20–30 m. wide are cleared and closely sown or planted, leaving intervening strips of 20 m. with only the large trees girdled. Choice of sowing or planting depends on seed years and time schedule. Costs in man-days/ha. are given for sowing and planting in strips and in taungya.

340. RENIER, J. M. Note sur les problèmes forestiers au Ruanda. **[Forest problems in Ruanda [Belgian Congo].]** [*Proc.*] *1st Conf. for. interafric., Abidjan 1951*, 1952 (473–9). [F.e.]

Ruanda (2,450,000 ha.) has 162,490 ha. of natural and 20,748 ha. (1950) of planted forest (7·48%) and ca. 150,000 ha. of wooded savannas. The natural forest lies at high elevations, mainly on the Congo-Nile parting, and is now separated into (*a*) 23,238 ha. at 2200–4500 m. containing the high volcanoes and only of botanical interest, (*b*) 138,142 ha. containing the Nile crest reserve which extends for 24,000 ha. into Urundi, and (*c*) a third block of 1110 ha. The more valuable timbers (occurring between 1800 and 2200 m.) are *Strombosia grandifolia, Entandrophragma speciosum, Symphonia globulifera, Sideroxylon* sp., *Carapa grandiflora* and *Cassipourea congensis*. Here enrichment in strips and closer plantings of the first 3 species + *Piptadenia buchananii, Podocarpus usambarensis*, and *Pygeum africanum* has begun (250 ha.). Plantations of exotics (*Grevillea*, Cypresses and Black Wattle) will be restricted to the 2200- to 2500-m. zone. Since 1931 every group of 300 taxpayers has been required to plant annually one ha. of Black Wattle, Cypresses, *Grevillea robusta, Cassia spectabilis, Cedrela serrata* or Eucalypts, which has resulted to date in over 19,000 ha. of plantations, scattered throughout the populated areas.

231. *Natural Regeneration*

See also Nos. 236 *et seq.*, 294, 331, 336, 456, 473, 664–5.

341. BAY R. B., OLSON, C. E., JR., and SCHNEIDER, A. E. **The character and extent of reproduction in certain upland cut over Spruce/Balsam/hardwood stands in north-central Minnesota.** *Minn. For. Note* No. 30, 1954. pp. 2.

An understorey predominantly of *Abies balsamea* can be expected to develop under the hardwood parts of reproduction stands. About half the Fir and Spruce reproduction was advance growth, but almost all the hardwood regeneration became established after the area had been cut over.

342. LOGAN, K. T. **Reproduction after an improvement cutting in a mixedwood stand. Project P-314.** *Silv. Leafl. For. Br. Can.* No. 81, 1953. pp. 3.

The nature of the treatment has already been described [see *For. Abstr.* 12 (No. 1976)]. In 1952, about 26 years after the improvement cutting was made, regeneration of *Abies balsamea, Picea glauca* and *Acer rubrum* was good on the treated plot, while on the control plot, regeneration of *A. balsamea* and *Populus tremuloides* was plentiful but suppressed. Growth of seedlings on the control plot may be expected to improve because of the increasing loss in the residual stand by butt rot and wind breakage.

343. ROWE, J. S. **Delayed germination of White Spruce seed on burned ground. Project MS-159.** *Silv. Leafl. For. Br. Can.* No. 84, 1953. pp. 3.

Observations in 1951 showed that White Spruce seed germinated in the forest from mid-June till early September. On scarified soil and on undisturbed humus under a mixed stand most of the seed germinated in July, but on burned ground in an open cut-over stand maximum germination was at least 1½ months later.

344. LITTLE, S., and MOHR, J. J. **Reproducing Pine stands on the eastern shore of Maryland using a seed-tree cutting and preparing seed beds with machinery and summer fires.** *Sta. Pap. Ntheast. For. Exp. Sta.* No. 67, 1954. pp. 11. 9 refs.

Preliminary results after 1 year indicate that burning, or a combination of burning and ploughing, favours Pine regeneration from seed more than ploughing alone. All treatments caused a decrease in the total number of hardwoods, and this was

greatest on ploughed and burned, and burned plots. Pines may form about 80% of the next stand.

345. HORTON, K. W. **Causes of variation in the stocking of Lodgepole Pine regeneration following fire. Project K-71.** *Silv. Leafl. For. Br. Can.* No. 95, 1953. pp. 5. 4 refs.

Failure occurred on excessively dry or moist sites, or those with a sparse seed source, or where there had been logging. Understocking was found on the steepest slopes, S. aspects, and shallow eroded soils. Overstocking was found on N. aspects and on podzol and grey podzolic soil groups. Optimum stocking was found in fairly rigorous site conditions when seed supply was abundant and other factors normal.

346. CLARK, J. D., LEHRLE, L. W. W., and SMITH, J. H. G. **Scarification in Engelmann Spruce/Alpine Fir forests.** *Res. Note B.C. For. Serv.* No. 25, 1954. pp. 7 + 3 photos.

Scarification of cut-over areas with a tractor fitted with a brush-piling blade cost ca. $20/acre and ensured adequate natural regeneration of *Picea engelmannii* and *Abies lasiocarpa* where there was a seed supply.

347. HUTNIK, R. J. **Effect of seedbed condition on Paper Birch reproduction.** *J. For.* 52 (7), 1954 (494–5). 2 refs.

The regeneration requirements of this pioneer species are imperfectly known. It is commoner on abandoned pastures than on the thicker sod of old hayfields, and the densest invasions seem to be the sequel of moderate fires. A good seedbed can be obtained by exposing the mineral soil by clear cutting, summer logging, tractor skidding, disking and even controlled burning, though fires too fierce may produce mainly grass and fern and those too mild do not effectively destroy the upper and lower matted layers of hardwood litter.

348. METEER, J. W., and ANDERSON, W. R. **Trends in species composition show pattern of regeneration of Yellow Poplar, White Ash, and Basswood.** *For. Mimeo. Ohio agric. Exp. Sta.* No. 13, 1953. pp. 3.

Analysis of several mixed hardwood stands showed that some shade-intolerant species (*Liriodendron tulipifera* and *Fraxinus americana*) can, in some conditions, be maintained and even increased under lighter systems of cutting than are usually deemed necessary. Oak, however, fails to reproduce in closed or partially closed stands.

349. SMITH, A. M. S. **Natural regeneration of *Eucalyptus saligna* and *robusta*.** *Tech. Note For. Dep. Uganda* No. 2/54, 1954. pp. 1.

In 1953 a fire burned the peat of a swamp-reclamation plantation to 2 ft. deep, killed 2–3 acres of these Eucalypts and exposed the mineral soil to the then available seed. A dense 10-ft. regeneration mainly of *E. saligna* has resulted. A failure of regeneration after a similar fire is attributed to lack of seed on the trees at the time.

350. HASZÁK, A. Az örségi erdei fenyök természetes felújítása. **[Natural regeneration of Pine in the Örség region.]** *Erdö* 2 (1), 1953 (50–7, 111). [Hu.g.]

The author presents some data on the ecology, soils and climate of the region (in western Hungary). The Pine stands are the most outstanding feature of the forests. Two altitudinal types can be distinguished. In the lower are found Beech, Hornbeam, and often Oak; in the upper, Pine is dominant. Areas are also to be found where the Pine is overtopped by Larch. According to old working plans the Pine is indigenous here. It suffers from few pests and diseases. All the species of this region can be regenerated naturally. The methods at present in use are discussed. *From author's summary.*

351. GEELHAND, G. Le semis naturel de Douglas en Campine. **[Natural regeneration of *Pseudotsuga taxifolia* in Kempen.]** *Bull. Soc. for. Belg.* 61 (6), 1954 (282–96 + 3 photos). 5 refs. [F.]

Notes on the occurrence of natural regeneration of *P. taxifolia* in the Netherlands and discussion of ways of obtaining it in Belgium.

352. ÅHLSTRÖM, Å. Några markberedningresultat från Kulbäcksliden. **[Some results of site preparation in Kulbäcksliden.]** *Norrlands Skogsv-Förb. Tidskr.* 1954 (2), (283–301). 12 refs. [Sw.] (*Medd. SkogsforsknInst., Stockh., Ser. Uppsatser* No. 31.)

A survey was made in 1953 on 8 experimental areas with their sites prepared for natural regeneration between 1941 and 1949. Preparation was by hand-hoeing the seed spots, or by strip cultivating with a horse-drawn cultivator either with or without burning over. The number of plants/ha. was generally adequate; the number of blank spots low, 0–7%, except in 3 of the areas. On one, site preparation (hand hoeing) had taken place before final felling: this practice is not recommended. The other 2 areas had been felled and cultivated only a few years before the survey. Measurements of height distribution within the areas after cleaning to 3200 trees/ha. showed that the difference between the tallest and shortest remaining trees was within reasonable limits, amounting to the growth of ca. 3 growing seasons. Age distinction was studied on one of the older areas and is shown in graphs. A study of burnt and unburnt sites showed that the number of trees on the cultivated spots was higher in relation to those outside on the unburnt than on the burnt sites. Height measurements showed that on burnt sites plants were taller outside the cultivated areas; on unburnt sites there was slight evidence of the opposite tendency. Birch regeneration appeared to be favoured both by soil cultivation and by burning. Some figures of costs with the horse-drawn cultivator are given.

353. SCHIMITSCHEK, G., and JAHN, E. Bodenverwundung von Schlagflächen in ihrer Rückwirkung auf Lebendverbau des Bodens und Verjüngung. **[Soil working on clear-felled areas and its effect on the soil and regeneration.]** *Öst. Vjschr. Forstw.* 95 (2), 1954 (86–99). 12 refs. [G.g.]

Eleven years after soil cultivation, a site 1300 m. above sea level in the Tyrol showed good aeration, a rich soil fauna, favourable humification and low acidity, with satisfactory regeneration of Larch and Spruce. Neighbouring untreated sites have thick

raw humus layers, strong acidity, insufficient soil fauna and little regeneration.

354. Osmaston, H. A. **Death and coppicing of *Eucalyptus saligna* at Mbarara.** *Tech. Note For. Dep. Uganda* No. 7/54, 1954. pp. 2.

The replacement requirement of stools coppiced in the dry season was about 60% against 6% in the wet; the difference is probably primarily due to drought, termite damage both here and among newly planted field plants being considered secondary.

232. *Artificial Regeneration*

See also No. 294.

355. Chandler, W. G. **Pine planting operations of A. P. M. Forests Pty. Ltd.** *Aust. For.* 17 (2), 1953 (37–42 + 5 photos).

Describes operations undertaken by Australian Paper Manufacturers Ltd. to establish extensive plantations of *Pinus radiata* in Victoria to provide a future supply of pulpwood. Mechanized methods of preparing the site and planting are described.

356. **Recent developments in planting and direct seeding in the Southern Pine region: Proceedings of the 3rd annual forestry symposium, Louisiana State University, Baton Rouge, Louisiana, April 8–9, 1954.** School of Forestry, Louisiana State University, Baton Rouge, La. 1954. pp. 104. Many refs.

Includes the following papers: Direct seeding of Longleaf Pine with special reference to sowing on disked strips (*C. H. Lewis, Jr.*); Direct seeding research with Longleaf, Loblolly and Slash Pines (*W. F. Mann, Jr.*); Direct seeding versus planting (*F. M. Cossitt*); Soil-site classification as a guide to plantation survival (*R. Zahner*); The growth intercept method of site classification (*P. C. Wakeley*) [Successive annual increases in height of southern Pines can readily be distinguished on trees up to 15 and sometimes even 20 years old. By examination of each tree in turn, 5 successive years of growth are identified, the first of which includes the breast-high mark. The zero end of a steel tape attached to a suitable pole is raised to the top of the 5th year's growth, and the total growth made in 5 years is read directly from the tape opposite the beginning of the year's growth that includes breast-high mark. Intercepts based on 25-tree samples varied from 19 ft. or more on the better sites to 16 ft. on poorer ones.]; Choice of species and stand composition (*B. A. Bateman*); The role of genetics in improving planting stock (*B. Zobel*); Improving the physiological quality of planting stock (*J. T. May*); Necessary precautions in lifting, packing, and shipping seedlings and their handling in the field (*N. W. Sentell*); Increasing the survival of planted Longleaf Pine seedlings (*R. M. Allen*); Preparation of some adverse sites in the Southeast (*D. L. Fassnacht*); Underplanting of Southern Pine (*R. H. Clark*); Machine planting techniques with the heavy-duty planter (*R. E. Gipson*); Machine planting with light farmer-size planters (*F. Fallin*); Protecting the young plantation (*G. W. Stanley*); The management of young Southern Pine plantations (*P. M. Garrison*).

357. Bouček, B. Jedlý kaštan. [***Castanea sativa.***] *Lesn. Práce* 33 (3), 1954 (105–8). [Cz.]

Chestnuts in Czechoslovakia seem to belong to several varieties, differing, *inter alia*, in the size and colour of fruits and the flowering time. Some information is given on seed storage, sowing and planting.

232.1. Choice and Trial of Species, Races etc.

See also Nos. 285–8, 293–4, 301, 434–6, 441, 487.

232.11. *Species Trials (by Localities), including Forest Gardens, Trials of Exotics etc.*

See also Nos. 160–1, 184, 340, 417, 484, 577, 585, 592, 607–8, 767, 773, 1268–9, 1272–8, 1280, 1282–3, 1286–7.

358. Gibbs, J. A. **Growth of planted Norway Spruce [*Picea abies*] in Secrest Arboretum [Ohio].** *For. Mimeo. Ohio agric. Exp. Sta.* No. 10, 1953. pp. 2 + plate.

359. Girgidov, D. Ja. Sosna Murreja i dub krasnyĭ v severo-zapadnyh raĭonah SSSR. [**Lodgepole Pine and Red Oak in the north-western regions of the U.S.S.R.**] *Lesn. Hoz.* 5 (7), 1952 (8–13). [Russ.]

Recommends these two species for planting in the north-west of the U.S.S.R. Gives for Lodgepole Pine some mensurational data plus very brief notes on ground vegetation and soil in three 23- to 30-year-old plantations in the Karelo-Finnish S.S.R., Leningrad province (in mixture with Scots Pine), and Estonia. Wood samples [number not stated] from the first two of these stands have been tested, and data are tabulated for density, compression [||?], static and impact bending strengths, and hardness (transverse, radial and tangential). The merits of Lodgepole Pine are rather faster growth than Scots Pine, resistance to frost and to needle-cast [*Lophodermium*?], and tolerance of poor soils. Its wood is of good quality and is possibly suitable for pulping. A disadvantage is its poor self-pruning. Very brief notes are included on seed, nursery practice and planting.

A similar but less detailed account is given of Red Oak [*Quercus borealis*], citing some data for a 55-year-old stand (in mixture with *Pinus strobus*, *Picea abies* and *Fagus sylvatica*) and several young stands in Latvia, a young stand in Estonia, and some park trees and nursery stock in Leningrad province. The observations show that this species stands frost fairly well, grows fast, bears seed and will regenerate naturally in these regions, transplants well, and appears resistant to Oak mildew. It is best suited by well drained sandy or light clay-loams, especially old arable land. Considerable areas of seed-bearing age are to be found in Latvia, and seed could also be obtained from garden and park trees in Estonia and Leningrad Province. Brief recommendations are made on seed collection and sowing.

360. Miettinen, L. Piirteitä Murrayn männyn kasvusta ja kehytyksestä. [**On the growth and development of Lodgepole Pine stands (*Pinus***

***contorta* var. *latifolia*).]** *Commun. Inst. for. Fenn.* 40 (9), 1952. pp. 14. [Fi.e.]

Measurements made on sample plots of Lodgepole Pine ca. 40 years old, in S. Finland, were compared with comparable data for Scots Pine and Spruce. Mean diameter was almost the same for all three, but Lodgepole Pine exceeded the others in both mean and maximum height. It also had a smaller % of bark. Its use for pulpwood plantations is recommended.

361. HORVAT, A. Prilog poznavanju uzgoja plutnjaka (*Quercus suber* L.). **[Growing *Q. suber*.]** *Šum. List* 78 (1), 1954 (1–11). 28 refs. [Croat. croat.f.]

Locations in Jugoslavia where *Q. suber* is likely to do well are indicated.

362. CHARDENON, J. Les peupliers américains d'importation récente. **[American Poplars recently imported [into France].]** [*Pap.*] *8th int. bot. Congr., Paris, Sect. 13* 1954 (144–5). [F.] X.

363. KOLTAY, G. Csemetekertjeink nyárszaporító anyaga. **[The Poplar planting stock in our forest nurseries.]** *Erdö* 2 (1), 1953 (42–9, 110). [Hu.g.]

Discusses the usefulness of Poplar for afforestation of the Hungarian foothills, and the need for care in the selection of planting stock. In 86 forest nurseries investigated, the following species were being raised in the proportions given: *Populus marilandica* (21·3%), *P. serotina* (4·7%), *P. robusta* (59·1%), *P. nigra* (11·9%) and other Poplar species 3%. This shows excessive emphasis on *P. robusta* and too little on *P. marilandica* and *P. serotina*. More attention should also be paid to provenance and plant health. *From author's summary.*

364. Résumé des activités du groupe de travail français de l'*Eucalyptus*. **[Report on the activities of the French *Eucalyptus* working party.]** [*Docum.*] *4th Sess. FAO Jt. Subcomm. Medit. For. Probl.* No. *FAO/CEF/SCM/46–C*, 1954. pp. 5. [F.]

Includes notes on trial plantations in the south of France and Corsica.

365. KARSCHON, R. La culture des *Eucalyptus* en Israel. **[The silviculture of Eucalypts in Israel.]** [*Docum.*] *4th Sess. FAO Jt. Subcomm. Medit. For. Probl.* No. *FAO/CEF/SCM/46–B*, 1954. pp. 11 + 2 gphs. 10 refs. [F.]

Deals mainly with *E. rostrata* which has been more widely planted and more successful than other species.

366. SMEYERS, F. Considérations sur quelques peuplements exotiques du Haut-Ituri. **[Some exotic stands in Upper Ituri [NE Belgian Congo].]** [*Proc.*] *1st Conf. for. interafric., Abidjan 1951*, 1952 (427–40). 9 refs. [F.e.]

The Ituri plateaux (1600–2000 m.) enjoy 1200–1300 mm. of rain annually, in 2 wet seasons. Association tables are given to show the reversion to forest of the man-made *Hyparrhenia cymbaria* savanna after 21 years' protection. Production tables show cu.m./ha. of 16- to 19-year Black Wattle, Cypresses, 7 species of Eucalypts, and *Grevillea robusta*, these data being compared with those for natural forest, the structure of which is detailed.

367. **[Résumé of results from exotic conifers in the South Sudan.]** *Rep. For. Dep. Sudan 1952/53*, 1954 (44–6).

368. PARRY, M. S. **Tree planting in Tanganyika. IV. Species for coastal areas.** *E. Afr. agric. J.* 20 (1), 1954 (49–53).

Silvicultural notes on over 30 species. [Cf. *For. Abstr.* 15 (No. 3438).]

369. DALE, I. R. **Exotic Bamboos.** *Tech. Note For. Dep. Uganda* No. 12/54, 1954. pp. 2.

Lists, with short notes, 13 species introduced into Uganda, chiefly in the Entebbe Botanic Gardens.

370. CATINOT. Rapport sur certaines questions de sylviculture en Oubangui-Chari. **[Report on certain aspects of silviculture in Ubangi-Shari.]** [*Proc.*] *1st Conf. for. interafric., Abidjan 1951*, 1952 (359–66). [F.e.]

History of the successful introduction of *Cassia siamea* into savanna country with 1100–1900 mm. annual rainfall and 4 months dry. Yield expected is 150–180 steres/ha. plus poles in 6–8 years

371. **[Trials of tan Wattles in the Darjeeling district.]** *Rep. For. Res. W. Bengal 1951/52*, 1954 (4).

Acacia mollissima seed germinated much better than that of *A. decurrens*. Growth averaged 6 ft. in the first 3 years (maximum 13 ft.).

372. **[*Dalbergia cultrata* in W. Bengal.]** *Rep. For. Res. W. Bengal 1951/52*, 1954 (5).

This species, a native of Upper Burma, germinates well in W. Bengal and stumps excellently.

373. WORTHINGTON, T. B. **Trees for Trinco.** *Ceylon Forester* (*n.s.*) 1 (4), 1954 (152–8).

Notes on 55 exotic species planted at Trincomalee since 1941 with some success.

232.12. *Races and Provenance Trials*

See also Nos. 117–8, 159, 200–2, 592.

374. VEEN, B. **General remarks on provenance research in forestry.** *Euphytica* 3 (2), 1954 (89–96). 6 refs. [E.du.]

375. **[Provenance trials of *Pinus halepensis* var. *brutia*.]** *Rep. For. Dep. Cyprus 1953*, 1954 (24).

Preliminary analysis of data shows a distinct correlation between the survival rate in the first year after sowing and the geology of the site from which the seed originated; seed originating from trees growing on calcareous formations survives better when sown on other calcareous sites, and seed originating from igneous formations survives better when sown on igneous sites.

376. HOLST, M. J. **A provenance experiment in Scots Pine (*Pinus sylvestris*).** *Silv. Leafl. For. Br. Can.* No. 96, 1953. pp. 4.

Investigations of height and form were made in 1943 and 1950 on trees of different European provenance sown in 1940 at the Petawawa Forest Experiment Station. The most promising strains were those from E. Prussia, Poland and Latvia. Plantations of proved Baltic origin from seed imported in 1930 are found in E. Canada and the New England States and from these seed may safely be collected.

377. Bjerke, S. En skovfyrproveniens for tørre egne? **[A Scots Pine provenance for dry districts?]** *Dansk Skovforen. Tidsskr.* 38 (8), 1953 (538–54). [Dan.]

The Pine plantations of S.E. Djursland, eastern Jutland, on lean sands in a low-rainfall area, are largely in a critical condition owing to attacks by *Fomes annosus* and barkbeetles, but some grounds exist for the belief that the Pine used is not of the best provenance for the site. The author's visits to S. Sweden suggest that a suitable provenance might well be Trolle-Ljungby, in north-east Skåne, where there appears to exist a local race that thrives in a similar climate, with a wide soil tolerance—even of the driest shifting sands—on sites bearing ground vegetation of the same type as in Djursland. He gives general notes on this tree, its stem and crown form, growth and yield of various assortments from thinnings, followed by details of climate, soil and ground vegetation.

232.13. *Trials of Hybrids and Other Products of Tree Breeding*

See also No. 116.

378. Haugberg, M. Noen resultater fra avkommforsøk med asp. **[Some results of progeny trials with Aspen.]** *Norsk Skogind.* 8 (5), 1954 (180–5). 3 refs. [Nor.nor.e.]

Results of three sets of trials laid down, one in 1948 and two in 1950, showed that the hybrid *Populus tremula* × *P. tremuloides* is, to the ages covered, superior in height growth and survival to *P. tremula*. Cutting the plants right back on planting had no effect on height growth or mortality. Measurements on plants developed from root suckers (the normal method of regeneration in Norway) showed that their height growth was superior to that of the hybrid. The root suckers measured were, however, on better sites than the hybrids, and it is not expected that this superiority will be maintained. The hybrids showed poorer growth in these than in some Swedish trials, possibly because of site differences. The *P. tremula* parents in these trials were from Denmark and Sweden and the *P. tremuloides* parents from E. Canada. It is hoped to obtain hybrids suited to the Norwegian climate by selecting the *P. tremula* from within the range of Norwegian Aspen and crossing with *P. tremuloides* from different parts of America.

232.2. Preparatory Work, Auxiliary Measures

See also Nos. 339, 355.

379. Laurýn, M., and Macák, Z. Mechanická příprava půdy pří zalesňování kalamitních holin. **[Mechanical preparation of soil for the reforestation of areas denuded by natural calamities.]** *Lesn. Práce* 33 (4), 1954 (162–75). [Cz.]

[Cf. *For. Abstr.* 15 (No. 213).] Describes the afforestation of a 13·4-ha. site; alt. 476 m., S. aspect, moderate slope, plant cover before soil preparation: dense *Calamagrostis* with a few Birch; soil derived from decomposed Permian-Carboniferous strata. The site was cultivated with the 'Great Eman' plough in the winter and spring of 1951–52. Only 5·43 ha. of the area was under furrows, ca. 21 cm. deep and 56–60 cm. wide. In April, 1952, ca. 210,000 plants 1–3 years old, were planted in the furrows (mainly Oak, Alder, Lime and Pine but also Robinia, Elm, Poplar, Beech and Larch); they were treated in Sept. 1952 with ground limestone, and freed in July and Sept. 1953, from *Calamagrostis*. Browsing was considerably reduced in 1952–53 by the use of a repellent coating of 'Resiston'. The average height increment of Alder (1 year old in 1952) was 32 cm. in 1953, of Pine 14·5 cm., of Larch 50·3 cm., of Oak (where not browsed) up to 20 cm. As much as 30% of the Oak died in the first year, but some of it produced coppice shoots. It was found that the height and diameter of the stem, and the development of the root system were much greater for Pine and Alder when planted in furrows than outside them (among weeds).

380. Mařan, B. Příprava půdy před zalesněním. **[Soil preparation before afforestation.]** *Za social. Zeměd.* 4 (6), 1954 (584–92). [Cz.] C.G.B.

Russian experience teaches that soil preparation before afforestation is a paying proposition and results in (1) improvement of the physical, chemical and biological properties of the soil, (2) reduction of plant mortality, and (3) better growth of plants and an earlier closing of canopy. The essential is to improve the living conditions of the forest plants in their earliest development stage, by ensuring an adequate supply of nutrients, water, heat, and light. Mineral fertilizers not only add the required chemical elements, but also influence many physical properties of the soil. One of the factors always to be kept in mind is the regulation of water conditions in the soil, viz. preventing the nutrients from being leached out, and at the same time maintaining an adequate moisture content. Sandy floodlands, soils formed by the weathering of greywacke flint and some slates, the podzolized non-forest soils, and some impoverished forest soils, should be manured according to their needs, with Ca, P, K or N fertilizers or combinations of these; and with organic (e.g. green) manure. The best combination is obtained with compost mixed with basic diabase, basalt, or similar dust. Sandy soils with a moderate content of mineral nutrients, but poor in humus, have a neutral or weak acid reaction and are excessively permeable to water. Very little Czechoslovakian experience is available for these soils but Russian practice points to the advisability of covering them with unprocessed, acid surface peat, or of digging it deep into the soil in furrows or nests. The third group of soils are coarse and droughty (podzolized or non-podzolized) sands which are tentatively treated with marl and peat, along with measures aiming at the reversal of the natural water movement. In podzolized, podzolic, and podzol-gley soils in Czechoslovakia, the layer of raw humus is often thick, but the mineral nutrients and N are only released at a very slow rate; here the high acidity is to be lowered by lime, marl, or basic mineral dust, while the decomposition, humification and mineralization of excess organic substance is to be promoted by different methods (e.g. mechanical soil preparation, plus liming, and growing of Leguminosae).

The fifth group includes soils rich in nutrients but suffering from a deficit or excess of water, both due to insufficient permeability of the lower horizons. Besides mechanical preparation of the soil, the use of the following species was found to be expedient for penetrating the lower horizons; lupins, *Cytisus scoparius*, *Alnus glutinosa*, and some other trees. Drainage measures give good results only during wet periods. Mounding is unfavourable to survival on soils tending to peat formation and where the roots cannot penetrate the underlying soil.

381. Lhotský, J., and Kabeláčova, E. Některé zkušenosti s mechanickou přípravou půdy před zalesněním. **[Some experience with mechanical preparation of soil before afforestation.]** *Za social. Zeměd.* 4 (4), 1954 (389–95). [Cz.cz.] C.G.B.

Presents, in the form of graphs and tables, the results of analyses and measurements of some chemical, biological and physical properties of soil (1) covered with weeds, (2) after single-furrow ploughing, (3) after complete cultivation by agricultural methods. It was found that (3) gave the best results (e.g. as far as moisture conditions and nitrate content were concerned); the bottom of furrow (2) presents less favourable biochemical conditions for both sowing and planting, but better microclimatic conditions than (3); (1) is least favourable from all aspects.

382. **[Ridging with a Killefer plough before planting on the clay plains.]** *Rep. For. Dep. Sudan 1952/53*, 1954 (38–9).

Further remeasurements show that most of the species tested in the Upper Nile province did in fact benefit from ridging. Earlier reports [cf. *For. Abstr.* 15 (No. 2490)] which showed no difference between ridged and non-ridged plantations were from S. Kassala. The difference may be due to the heavier clay in the Upper Nile province and to the fact that the ground is often actually flooded with several inches of water for weeks in the rainy season. The ridges raise the plants above this flood level.

383. Collin, A. Essais de collaboration avec les indigènes en vue de l'enrichissement des forêts en Mayumbe. **[Experiments in collaboration with the natives for the enrichment of the Mayumbe forests.]** [*Proc.*] 1*st Conf. for. interafric., Abidjan 1951*, 1952 (459–65). [F.e.]

A kind of share-cropping in forest reserve is described, in which forest labourers and villagers are participants. Forestry workers clear 50-are plots at the expense of villagers [who may be the same persons as the forestry workers], and the villagers then plant them with bananas at 4 × 4 m., which they tend and harvest. The forestry workers interplant the plots with valuable forest species at 8 × 12 m. Production of bananas in 5 years is ca. 8000 kg./50 are, sold at Fr.2·5/kg., an annual income of Fr.4000. Costs of work done in establishment are recovered by the labourers from these proceeds. Outside the reserves, where valuable regeneration is present in the fallow, it is protected by propaganda, supervision and prosecution for damage, the work beginning at the clearing of new fields, when the maximum number of good stems is retained consistent with cropping. Where valuable regeneration is wanting, the planting of stumps of *Terminalia superba* and *Chlorophora excelsa* at 20 × 20 m. is resorted to. Rewards of Fr.2 per established plant are paid. The programme and finance of this scheme is detailed. It is hoped to obtain an accretion in forest capital of 100,000 cu.m./year at the cost of Fr.5/cu.m.

232.3. Seed, Nursery Practice, Direct Sowing

232.31. *Seed*

See also No. 471.

232.311. Seed Production (Seed Years, Seed Crops; Seed Orchards and Methods of Inducing Seed Production)

See also Nos. 212, 236–7.

384. Schrötter, F. W. Frhr. von. Forstgenetik im Waldbau. **[Forest genetics in silviculture.]** *Z. Forstgenet.* 3 (4), 1954 (69–83). Many refs. [G.g.e.]

Discusses and presents some proposals for: seed certification, selection of seed trees, and seed plantations, and makes special reference to work done in these fields in Schleswig-Holstein.

385. Langner, W. Über die Ursachen einiger phänotypischer Besonderheiten bei Fichtenpfropflingen. **[The causes of some phenotypic peculiarities in Spruce grafts.]** *Z. Forstgenet.* 3 (4), 1954 (83–6). 7 refs. [G.g.e.]

Abnormal cones on Spruce grafts [cf. *For. Abstr.* 12 (No. 100)] were found, contrary to a previous hypothesis, to have a genetic origin. The scions used were not, as formerly assumed, taken from an old and normal Spruce, but from *Picea abies* var. *acrocona*, a form with characters resembling those of the grafts.

386. Johnsson, H., Kiellander, C. L., and Stefansson, E. Kottutveckling och fröbeskaffenhet hos ympträd av tall. **[Cone development and seed quality on Pine grafts.]** *Årsberätt. Fören. Växtförädl. Skogsträd 1953*, 1954 (20–51). 6 refs. [Sw.sw.] Also in *Svenska SkogsvFören. Tidskr.* 51 (4), 1953 (358–89).

[Cf. *For. Abstr.* 15 (No. 3476).] A study was made in 1952–3 at Ekebo, Skåne, 7–8 years after grafting, and at Sundmo and Stigsjö, Ångermanland, 6–7 years after grafting, on length, breadth, weight, volume (determined by water displacement) and length/breadth ratio of cones, and on total seed weight, 1000-seed weight, % of empty seeds, 1000-seed weight of full seeds and viability of full seeds. Results are tabulated and statistically analysed. At Ekebo and Stigsjö graft trees had larger seeds and cones than the parents. The differences at Stigsjö were greater, average cone volume of grafts being 67% higher, weight 60%, length 20%, and breadth 16%, 1000-seed weight 60%, number of unsorted seeds per cone 11% and full seeds per cone 9% higher than for parent trees, while the seed viability of the grafts was 78 as against 12·3%; at both places, however, the length/breadth ratio of cones was about the same in parent and graft material. The Sundmo material showed the same tendencies, but to a much smaller extent; the differences were

greatest when the grafts were grown in a better climate than the parent (as was the case at Ekebo and Stigsjö and with part of the Sundmo material). Investigations at Ekebo showed that (1) there were significant differences between 1952 and 1953 in cone volume, weight and breadth, the number of unsorted seeds per cone, and the frequency of empty seeds, but not in 1000-seed weight, the number of full seeds per cone or cone length and shape; (2) there was no significant difference between cone and seed properties from grafts on S. Swedish or N. Swedish (strong and slow growing respectively) stocks of *P. sylvestris* or on *P. mugo*; and (3) the 1000-seed weight was significantly higher on grass-grown than on cultivated sites. Discussion of the results emphasizes that seed plantations should be established in a better climate than that of the parent tree.

232.312. Seed Collection, Extraction and Grading (including Seed Weight)

See also No. 238.

387. Yli-Vakkuri, P. Maamme karistamoiden omistussuhteet, sijainti ja teho. **[The ownership, location and capacity of seed extracting stations in Finland.]** *Metsät. Aikak.* 1954 (6/7), (247 . . . 251). [Fi.e.]

232.314. Seed Purchase, Trade and Transport

See also Nos. 109, 384.

388. **1954 Forest seed directory.** F.A.O., Rome. 1954. pp. 110. [E.F.Span.]
Cf. *For. Abstr.* 15 (No. 2437).

232.315. Seed Storage and Treatment

See also Nos.357, 395–6.

389. Schubert, G. H. **Viability of various coniferous seeds after cold storage.** *J. For.* 52 (6), 1953 (446–7). 3 refs.

Covers the information referred to in *For. Abstr.* 14 (No. 2142), reproducing the table showing the viability after storage at 41° F. for 0–5, 6–10, 11–20 and over 21 years for 5 species of *Abies*, 6 Cypresses, 3 Spruces, 17 Pines, 2 *Pseudotsuga*, 2 *Sequoia*, 2 *Tsuga* etc., some of which are under their first recorded test.

390. Fodor, G., and Szent-István, A. Fenyömaggyüjtésünk és magtárolásunk helyzete. **[The present state of conifer seed collection and storage in Hungary.]** *Erdö* 2 (3), 1953 (265–70). 5 refs. [Hu.russ.g.]

The authors cite examples of good and bad practice in Hungary, emphasize the importance of a low water content (less than 15% and best below 10%) and give a table showing for *Pinus sylvestris*, *P. nigra* and *Picea abies* seed of 85% germinative capacity and for various periods of bulk and sample storage, the (consistently low) loss in germinability.

391. Panov, A. Novija iskustva pri stratifikaciji šumskog sjemena. **[New experience in the stratification of forest seeds.]** [*Publ.*] *Inst. nauč. šum. Istraž., Sarajevo* 2 (3), 1953. pp. 35. 8 refs. [Serb.e.f.g.]

[Cf. *For. Abstr.* 13 (No. 234).] Presents the results of research at 2 experiment stations and at the Research Institute at Sarajevo in 1950–53. In the experiment station near Mostar (Herzegovina), the following species were investigated: *Fraxinus ornus*, and (preliminary tests only) *Celtis australis* and *Prunus mahaleb*. In the second (Bosnian) station: *Fraxinus excelsior s.l.* (including *F. angustifolia*) and *Tilia* species. For *F. ornus* stratification in sand for 100–110 days is necessary, and it is not advisable to collect the seeds until fully ripe. Seed of *F. excelsior* should be collected as early as possible, with stratification for at least 210–220 days, preferably in a box with sand. Stratification periods vary for the 3 *Tilia* species, e.g. 171–211 days for *T. tomentosa*, and 144 days for *T. cordata*, while 176 days had no effect on *T. platyphyllos*. *Acer platanoides* gives better results when sown in autumn than when stratified.

392. Haddock, P. G. **Sapling Sugar Pines grown from excised mature embryos.** *J. For.* 52 (6), 1954 (434–7). 9 refs.

Details the technique and the recipe for the nutrient agar media by which *Pinus lambertiana* (now 10 years old) has been successfully grown. The applications indicated are: in conjunction with hastening of flowering, to provide more genetical material sooner; to circumvent endosperm/embryo incompatibility and difficult germination in hybrids; for treatment in polyploid induction; and to produce larger stock.

393. Sirén, G. Soveltuvatko siemenrakeet kylvösiemenen säästämiseen? **[Pelleted seed.]** *Metsät. Aikak.* 1954 (2/3), (61–2). [Fi.e.]

Best germination was obtained from pellets composed of $\frac{1}{8}$ by volume of mull soil and $\frac{6}{8}$ of sphagnum peat. This gave about 76% germination in the laboratory compared with 80% for unpelleted seed. To determine the resistance of pellets to the weather, 2500 were placed out of doors on 1 April, 1953, without any protection: the test was discontinued on 18 May when the seed began to germinate. During the period, night temperature varied between − 5 and + 3° C. and day temperature between 0 and + 12°. Wet snow and rain had dissolved 25% of the pellets to an even mass in which the seed germinated normally; the rest of the pelleted seeds equalled the germination of those germinated in the laboratory immediately after pelleting. Seed stored in dry pellets for the same period also germinated without difficulty. In field experiments pure peat was much inferior to the mixture, which could be further improved by adding fertilizers. Even the best results obtained were unsatisfactory and further experiments will be made. [Cf. *For. Abstr.* 12 (No. 1936).] *From author's summary.*

232.318. Seed Testing. Germination Tests. Seed Quality

See also No. 386.

394. Holmes, G. D. **Abstract of internationa rules for testing seed of forest tree species.** FAO, Rome. No. *FAO*/54/4/2292, 1954. pp. 38.

395. Bientjes, W. **Coniferous tree seed germination with particular reference to the effects of temperature, seed moisture, and stratification on germination behaviour of Western Hemlock [*Tsuga heterophylla*] seed.** *Abstr. of thesis*, in *For. Chron.* 30 (2), 1954 (234).

A detailed description is given of an experiment designed to develop a standard germination test for *T. heterophylla*. 'Naked stratification' for 7–9 weeks with a seed m.c. of 50–70% (obtained after ca. 33 hours' soaking) is followed by incubation at a constant temperature of 20° C. The test can be concluded in ca. 20 days.

396. Allen, G. S., and Bientjes, W. **Studies on coniferous tree seed at the University of British Columbia.** *For. Chron.* 30 (2), 1954 (183–96). 3 refs.

There is much variation in lots of Douglas Fir seed, some germinating well after 1 week's stratification and others not. The following procedure has been found to give consistent results: (1) soaking in tap-water at room temperature for 24–30 hours; (2) draining and surface drying with paper towels; (3) refrigeration at 0–2° C. in loosely covered tins for 6 weeks; (4) incubation, on vermiculite at 25° C. Similar procedures have been tried with other species, and tentative schedules are given for *Tsuga heterophylla*, *Pinus ponderosa*, *Abies nobilis* and *A. grandis*. Preliminary results are also given from storage tests.

397. Jamblinne, A. T. de, and Elens, A. A. Adaptation à la température et germination des graines chez *Pinus sylvestris* L. et chez *Pinus nigra* Arnold en Campine. **[Adaptation to temperature and germination of seeds of *P. sylvestris* and *P. nigra* in Campine.]** *Repr.* from *Agricultura*, *Louvain* (*Ser.* 2) 1, 1953 (99–117 + 2 gphs.) 6 refs. [F.f.flem.e.g.] (*Opera Collecta Cent. Bosbiol. Limburgse Kempen* Vol. 1, 1953.)

Marked differences were observed between the two species in rate of germination at different temperatures. *P. sylvestris* is consistently more rapid than *P. nigra*, except at 33° C. Maximum germination in both species took place at temperatures very near the optimum for speed of germination. This optimum was higher for *P. nigra* than for *P. sylvestris*. Low temperatures were more lethal to *P. nigra* and high temperature more lethal to *P. sylvestris*. Of the two species *P. nigra* showed less intraspecific variation.

398. Rehackova, O. Untersuchung über die jährlichen Veränderungen des Keimprozentes und der Keimungsgeschwindigkeit von Föhren- und Lärchensamen. **[A study of variation during the year in germinative capacity and germinative energy of Pine and Larch seed.]** *Schweiz. Z. Forstw.* 105 (8), 1954 (459–67). 5 refs. [G.g.f.] [Forest Research Institute, Zürich].

The germinative capacity (g.c.) and germinative energy (g.e.) of *Pinus sylvestris* and *Larix decidua* seed were determined monthly (300 seeds of each per month) during a year and the length of radicle measured. In the course of the year the g.c. of seed of both species, stored in air-tight jars at 8° C., diminished by ca. 8%. The g.e. varied little during this period. In general, high g.c. corresponded to high g.e. In Pine, the g.c. was relatively high in spring and autumn and relatively low in summer and winter; a similar, but less clearly defined periodicity was observed in Larch. In both Pine and Larch, 50% of viable seed germinated within 8 days; 75% germinated within 10 days for Larch and 13 days for Pine. Radicle length increased a little for both species in the course of the year; high g.c. corresponded to relatively low mean radicle length and vice versa.

232.32. *Plant Rearing. Nursery Practice*

See also No. 471.

399. Deasy, J. J. **Notes on the raising of forest trees in the nursery.** *Irish For.* 11 (1), 1954 (10–9).

Recommendations on site, pre-sowing treatment of seeds, weed control, lining out, fertilizers, control of fungus and insect pests, and reduction of frost damage, with tables showing consumption of seed, depth of cover and season to sow, and age, spacing and number/sq. yd. in lining out for different species.

232.322. Preparation and Treatment of Soil, including Maintenance of Fertility

See also Nos. 596, 1054.

400. Sato, Y. **[Research on methods of treatment to increase the increment of wood-fibre plants [i.e. those suitable as raw material for pulp] and to increase their wood-fibre content. (1) *Betula maximowicziana*.]** *Res. Bull. Exp. For. Hokkaido Univ.* 17 (1), 1954 (23–30 + 2 photos). 15 refs. [Jap.g.]

Two-year-old plants were given the following fertilizer treatments: 20% $(NH_4)_2SO_4$ at 45·38 g./sq. m., 17% Ca superphosphate at 22·69 g./sq. m., and pure K_2SO_4 at 0, 13·61, 27·22 or 54·44 g./sq.m. (the rate of $(NH_4)_2SO_4$ and Ca superphosphate remaining constant for all 4 rates of K_2SO_4). The N, P, 2K treatment (that with 27·22 g. K_2SO_4) gave considerably higher values for stem height, root-collar diameter, volume inside bark, and air-dry weight, than the other treatments. Increasing amounts of K_2SO_4 decreased the alcohol/benzene and 1% NaOH extractives, increased the cellulose contents and improved the relationship between fibre length and breadth. Results are given in tables with German legends.

232.323. Sowing and Covering

See also Nos. 357, 392.

401. Simunovic, M. Septembarska sjetva čempresovog sjemena u rasadniku. **[Nursery sowing of *Cupressus sempervirens* in September.]** [*Publ.*] *Inst. nauč. šum. Istraž., Sarajevo* 2 (2), 1953. pp. 16 + 10 photos. 9 refs. [Serb.serb.e.f.]

Presents the results of experiments with September sowings (1950 and 1951) of *C. sempervirens* in a nursery near Mostar, alt. ca. 100 m., with a Mediterranean climate, but with winter temperatures sometimes below 0° C. (minimum at this site, during the period concerned, − 5·2°). Compared with the usual March sowings (1950–52), the September sowings gave nearly the same results so far as stem

height and root length were concerned. The merits of such sowings are discussed and the details of procedure described.

402. McLeod, J. W. **Covering nursery seed-beds to encourage germination of coniferous seed. Project M-318.** *Silv. Leafl. For. Br. Can.* No. 98, 1953. pp. 2 + 3 gphs.

Germination of *Picea glauca* was higher under cellophane or jute hessian than under moss or in uncovered beds, but not always significantly so. Germination of *Pinus resinosa* was not significantly influenced by covering. Growth of both species was greatest in the beds covered with cellophane or hessian and least in those covered with moss.

403. Razmnoževanje topolov (belega, črnega, sivega in trepetlike) s semeni. **[Propagation of Poplars (*Populus alba, P. nigra, P. canescens* and *P. tremula*) from seed.]** *Gozd. Vestn.* 12 (4), 1954 (118–9). [Sloven.]

Poplar seed is first freed from its 'cotton' and then sown in soil containing more sand than humus, at 1-cm. spacing, shaded, and watered 1–3 times daily. Germination occurs within 1–4 days. Germination of 91–96% after 4 days was obtained at Zagreb for *P. nigra*, and nearly the same figure for *P. alba*. Ten days after germination the seedlings are pricked out at 3 × 3 cm. spacing into a bed of soil + sand and shaded for 30 days, when they are transplanted into an open bed at 10 × 10 cm. spacing; at the end of the first summer they are again transplanted at 10 × 30 cm. spacing. Two-year-old plants are ready for planting out.

232.324. Transplanting and Lining Out, including Grading of Seedlings

See No. 403.

232.325. Tending (in both Seedbeds and Transplant Beds)

404. Wolak, J. Obserwacje nad chwastami szkółki osikowej. **[Observations on weeds in an Aspen nursery.]** *Sylwan* 98 (2), 1954 (144–8). 7 refs. [Pol.]

The weed species in an Aspen nursery in Poland are listed and their effects on the seedling growth described. In unweeded soil the root system of seedlings is found at a greater depth than in weeded soil.

405. Lekander, J. Nytt hjälpmedel i kampen mot ogräset. **[A new method of controlling weeds.]** *Skogen* 41 (18), 1954 (286). [Sw.] [Skogsvårdsstyrelsen, Mariestad, Sweden.]

Short account of a gas ('Gasol')-fed flame-torch [origin not stated; apparently local] used experimentally on seedbeds with success.

406. Petersen, H. I. Forsøg med ukrudtsbekæmpelse i forstplanteskoler. **[Experiments on weed control in forest nurseries.]** *Dansk Skovforen. Tidsskr.* 37 (10), 1952 (475–87). 5 refs. [Dan.e.]

Reports on trials made in 1949–52, in Danish nurseries, of the light petroleum oils (1) Esso Weedkiller 35, (2) Pentox 1, and (3) Shell Weedkiller W, and also of (4) Shell Weedkiller DNC and (5) Pentox 2, a heavier oil. *Pre-emergence treatments*: (1) or (3) applied at a rate of 1000 litres/ha. to Norway Spruce seedbeds just before germination, on 18 May, killed almost all the weeds (*Poa annua, Stellaria media, Senecio vulgaris*). By 19 June some further weed seeds had germinated but were easy to remove by hand weeding. Spruce was undamaged. On Douglas Fir seedbeds, (1) applied on 11 June, one week before germination, killed all weeds (the same species) at a rate of 1000 and almost all at 500 litres/ha. [presumably with no damage to the Douglas Fir]. In these two cases the weeds were small seedlings: further trials were also made against weed growth up to 20 cm. high (*P. annua, S. vulgaris, Chenopodium* sp.), using (1), (4) or (5) [rate not indicated] on 11 June on seedbeds of Oak in course of germination but not yet emerged. Here (1) was less effective but (4) killed all, and (5) almost all weeds; a check 1 year later showed no considerable damage to the Oak, though (4) and (5) slightly reduced the number of seedlings compared with controls. These latter should be used with caution, (4) owing to its DNC content and (5) because it does not evaporate as readily as the light oils. Brief mention is also made of the experimental use of flamethrowers, which were effective against young weed seedlings but unsuitable for larger plants. *Post-emergence treatments*: These are reported only with reference to their effect on the tree seedlings; (1), (2) and (3) were used [but are not separately specified in the results]. One series involved the spraying of first-year Spruce on 12 June (seed-coats not shed), 26 June (seed-coats just shed), 17 July (2 whorls; start of lignification) and 20 Sept. (2–3 whorls; plants lignified), at each date with 4 different rates varying from 150 to 900 litres/ha. In the herbaceous stage, especially just after shedding the seed-coat, the seedlings proved very sensitive to the higher rates of application (> 300 litres/ha.), but at the two later dates even the highest rate caused few deaths. A further trial in which Spruce seedlings were sprayed (at the same 4 rates) either in late July alone or in late July and again on 20 Sept., indicated that two sprayings caused no more damage than one. A trial was also made of the effect of early spraying (26 May) with (1) at 1000 litres/ha. on various deciduous and coniferous seedlings. All deciduous species, Larches, and very young Norway Spruce, were severely damaged. The remaining conifers—*Tsuga* and *Thuja*—showed no mortality when 3–6 cm. high and very little (*Thuja* only) just after germination.

Some growth substances, DNC, and isopropylphenyl carbamate were also tried, but are regarded as unsuitable and are not further reported on.

Emphasis is laid on the importance of even spray distribution when using the light petroleum oils and of treating in dry, cool weather, preferably overcast.

232.327. Protection Measures in Nurseries

See Nos. 587, 626, 710, 722.

232.328. Vegetative Propagation

See also No. 109.

407. Fillmore, R. H. **Open frame propagation of cuttings under mist.** *Amer. Nurserym.* 100 (4), 1954 (12–13, 67–74). 12 refs.

Reviews the literature and gives rooting results for a number of ornamental plants, including *Juniperus* and *Picea* spp., with details of treatment from a large nursery. The advantages of intermittent misting are stressed. [Cf. *For. Abstr.* 15 (No. 3516).]

408. QUINTIN, S. Bouturage de quelques conifères et le rôle de l'auxine dans la formation des racines. **[Propagation by cuttings of some conifers, and the role of [synthetic] auxins in root formation.]** *Trav. Lab. for. Toulouse* 1 (5), Art. 16, 1954. pp. 22. 29 refs. [F.]

Reviews the literature and describes the author's experiments in the use of β-indoleacetic acid to promote rooting in cuttings of (1) *Abies alba*, (2) *Juniperus communis* and (3) *Picea abies* in the greenhouse. In winter, heat and a high relative humidity are essential; the take of cuttings in these conditions was (1) 2, (2) 65, and (3) 95 compared with 12% for all species planted in natural conditions. The use of growth regulators alone in aqueous solution had no effect, but by removing bark at the base of the cuttings and treating with β-indoleacetic acid in an aqueous solution (200 mg./litre) containing glucose (20 g./litre), a 91% take was obtained with *P. abies* cuttings.

Application of β-indoleacetic acid in the form of a lanolin paste gave good results with (1) and (3), which were much increased when application was made to girdled twigs before removal from the tree, which gave e.g. 70% take for (1). It was noticed that treatment with plain lanolin also had a positive effect on the rooting of (1). Cuttings from leading shoots rooted less well than those from lateral branches for both (1) and (3); those from fertile branches of (2) did less well than those from sterile branches.

Summer appears to be the most favourable season for rooting of (1) (70% success with 3% dose of β-indoleacetic acid in lanolin paste), and winter for (3) (91% success as noted above).

409. SAITO, K. **[Physiological studies on cuttings.]** *Bulletin of the Yamagata University (Agricultural Science), Yamagata* No. 1, 1950 (15–54). 26 refs. [Jap.e.] C.G.B.

Results include the following: (1) rooting and sprouting of cuttings, especially of deciduous trees, can be promoted by treatment with ethanol, the K salt of penicillin, or ultra-short waves; (2) upper roots of *Cryptomeria* cuttings almost always originate from wounds; (3) rooting and sprouting can be encouraged by treatment with juice from *Commelina communis*; and (4) the ease or difficulty of rooting is related to some extent to botanical families and orders. *From author's summary.*

410. MCNITT, V. J. **Top-grafting technique uses plastics.** *Amer. Nurserym.* 100 (6), 1954 (19, 63–5).

Describes a method of grafting on to the leading shoot, using a polyethylene sleeve containing a little damp sphagnum to cover the union and the whole scion, and an outer sleeve of muslin to provide shade in the early stages. The method is successful with species otherwise difficult to propagate and is suited to the production of ornamental trees by grafting, e.g. a weeping on to an upright variety.

411. MERGEN, F. **Grafting succulent Slash Pine scions.** *Res. Note Stheast. For. Exp. Sta.* No. 59, 1954. pp. 2.

The scion material, 1–1¾ in. long, from side branches of trees of different ages, was wedge-grafted in April on to the leaders of 1- to 3-year-old stocks. At the time of grafting these leaders had added up to 6 in. of growth, and the needles of the scion material had ruptured the sheath but were not yet fully developed. A bag of plastic sausage-casing, polyethylene plastic, or glassine, was tied over each graft to exclude wind movement and maintain a high relative humidity. The bags were removed gradually, beginning 4 weeks after grafting. Results, 8 months after grafting, are tabulated. The polyethylene bag gave the best results (15 out of 18 grafts were successful). Two of the 4 grafts in the plastic sausage-casings, and 4 of 7 grafts in glassine in full shade and 1 of 6 exposed to sunlight for a short period daily were successful. Three bottle grafts, 1 in polyethylene and 2 in plastic sausage-casing bags were successful. The results indicate that grafting Slash Pine scions in the succulent stage is a promising method of obtaining a large number of successful unions and prolonging the grafting season for several months.

412. **[Grafting *Pinus* spp.]** *Rep. For. Dep. Cyprus 1953*, 1954 (24).

Grafting of *Pinus halepensis* var. *brutia*, *P. pinea*, and *P. canariensis* has been attempted with success. Scions of all 3 species have been successfully established on rootstocks of the same and each of the other species. There appears to be a definite and different optimum season for best results for each species.

413. LJUNGER, Å. Primärympning och plusträdsurval av ek. **[Primary grafting of Oak and the selection of plus trees.]** *Årsberätt. Fören. Växtförädl. Skogsträd 1953*, 1954 (52–69). 11 refs. [Sw.] Also in *Svenska SkogsvFören. Tidskr.* 52 (2), 1954 (139–56).

'Primary' grafts (those in which scion material is taken from trees in the forest) were made in the greenhouse, using seedling stocks and scions from plus trees. The scion material was necessarily of poor quality, no sufficiently long one-year shoots being available, but 65% of the grafts survived the first summer and these will provide ample one-year shoots for secondary grafting. The selection of plus trees in Sweden is discussed.

414. MOSSE, B. **A study of bark-wood relationship in Apple stems.** *Rep. E. Malling Res. Sta. 1950/51*, 1952 (70–5 + 2 photos). 4 refs.

The bark % of several Apple varieties on a range of rootstocks was measured and it was found that scion stems on dwarfing rootstocks had a greater bark % than those on vigorous rootstocks. It is suggested that there is a direct rootstock effect on the bark %, which persists throughout the life of the tree, and also an increase in bark % on both grafted and unworked trees, when a tree enters the fruiting phase.

415. PEARCE, S. C., and DAVIES, G. E. **Studies in the measurement of Apple trees. II. The height at**

which trunk girths should be measured. *Rep. E. Malling Res. Sta. 1952/53*, 1954 (138–40).

Differences in growth brought about by pruning and manuring with K do not affect the shape of the stem, but rootstock does. It is recommended that girth should ordinarily be measured 12 in. above the graft union, with additional girths near the crotch in the case of rootstock trials.

232.329. Miscellaneous (including Greenhouses, Frames, Raising in Pots, Tubes etc.)

416. **Concrete pots used in nurseries.** *Equipm. Note, FAO* No. *A.* 3. 54, 1954 (1).

Note (with photo) on square concrete pots used in Israel for raising conifers and other evergreens.

417. Ceballos, L., and Ortuño, F. El Parque Nacional del Teide. **[The National Park of Teide.]** *Montes, Madrid* 10 (56), 1954 (85–92). [Span.]

Describes the Park, which was created in Tenerife in January 1954. The Spanish Forest Service have been making trials in this region since 1947 with 23 exotic species, mostly mountain conifers, not for large-scale afforestation, but for amenity planting in small groups. Ball plantings are made in the dry season (May–June) with 2-year-old stock transplanted 6 months previously into wicker baskets, 18 cm. in diam. and 20 cm. high, and acclimatized for these 6 months to high mountain conditions. In this way good, hardy ball plants are obtained. Good success has resulted, particularly with *Pinus radiata* and *Juniperus cedrus*.

232.33. *Formation of Stands by Direct Sowing*

See also Nos. 331, 356, 424, 588, 807.

418. Privalov, G. F. K voprosu o vodoobespečennosti duba v uslovijah Zapadnogo Kazahstana. **[The water supply of Oak [seedlings] in W. Kazakhstan.]** *Dokl. Akad. Nauk SSSR* 94 (5), 1954 (961–3). 6 refs. [Russ.] A.P.B.

In extension of work by Karandina showing that group ('nest') sowings of Oak are unsuitable for this region [cf. *For. Abstr.* 15 (No. 233)], the author selected an area sown in 1952 where, owing to irregular distribution of the acorns, the seedlings were distributed (1) singly and (2) in groups of up to 8, on a dark-chestnut clay-loam. Here, in the summer of 1953, seedlings of both types, selected for uniform height and development (15–18 cm. high, 5·5 mm. diameter at 3 cm. from the ground), were decapitated and the stumps immediately fitted with glass pipettes graduated correct to 0·01 ml., filled with water. The connexion was made with rubber tubing and care was taken to exclude air bubbles. The free end of the pipettes was drawn out to a capillary, so that evaporation should be negligible. After fitting, the pipettes were laid horizontally and protected with filter-paper coverings from direct sunlight, and hourly readings were taken of the movements of the water. Decapitation was done at 4, 9 and 12 a.m. Results are exemplified by those for two days—13 and 30 July [number of treated seedlings not specified]—and are illustrated in a graph. On 13 July, in hot, dry weather when the soil moisture to 60 cm. depth was 72% of field capacity, water was sucked from the pipette in all cases and never regained its initial level; on 30 July, after heavy rain two days previously, the soil moisture was 85% of field capacity and suction occurred only in the first 2 hours after decapitation, the water subsequently standing higher than its initial level in the pipettes. The suction effect, which was always most marked in the first hour after decapitation, is explained by a water deficit in the plants created by transpiration before decapitation. It was most marked with a dry soil and at mid-day, and was far more severe in (2) than in (1), thus confirming Karandina's conclusions.

419. McLeod, J. W. **Direct seeding of White Spruce on a controlled burn in New Brunswick. Project M-324.** *Silv. Leafl. For. Br. Can.* No. 97, 1953. pp. 3.

Results indicate that either covering the seed spots with sawdust or screening them would improve germination and stocking. The combination of the two methods would not be justified economically, and covering with sawdust (considerably cheaper) would be preferable.

420. Lavender, D. P. **A preliminary report on the Douglas Fir seeding experiment.** *Res. Note Ore. Bd. For.* No. 15, 1954. pp. 4.

An experiment was made in the Tillamook burn, to determine the optimum number of seeds per spot in direct sowing. General inferences are (1) that hemispherical caps of ¼-in. wire mesh give good protection to seeds and seedlings; (2) ca. 60% of Douglas Fir seeds produced seedlings, of which two-thirds survived; (3) if no more than 50% mortality occurs in the next 3 years, 8–10 seeds/spot would appear to be the best number to sow.

421. Tackle, D. **Comments on the Baker automatic tree seed planter.** *J. For.* 52 (7), 1954 (530–1).

Describes (with illustrations) the operation of this seed planter and discusses its advantages and disadvantages. Its operation depends upon a rhythmic timing by the person using it, so as to allow a single seed to be automatically selected from a seed hopper and deposited through a vertical shaft to a predetermined spot in the ground. The seed is covered by the operator treading on the seed spots as he walks along.

422. Sirén, G. **Aerial forest sowing.** *Finnish Paper and Timber, Helsinki* 5 (1), 1954 (5–7). [E.]

In experiments on sowing from aircraft, a Piper Cub, normal cruising speed 100 km./hour, was used, with a specially designed fishtail sprayer for distributing the seed. Figures are given showing the breadth of the effective seeding zone and the number of seeds/sq. m. For an aircraft height of 40 m., the effective seeding zone was 21 m., but this result could only be obtained if wind was slight. At 20 m. the seeding zone was 11 m., relatively calm air being less necessary. On the basis of these preliminary experiments, seed consumption was calculated at 1–1·5 kg./ha., and the probable number of plants as 2500/ha. Seed quantities might be reduced with an increase in site preparation (by burning and machine cultivation) and in germinative capacity. The area sown per day is calculated at 300 ha. for an aircraft

CORRIGENDA TO FORESTRY ABSTRACTS

Five-year Index. Part I.

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pathology *for* **1** 19, 192 .. .. .. *read* **2** 19, 192
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Vol. 6 Index (species) *Abies* read *A. spectabilis* (*A. webbiana*) 86, 155–6
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Vol. 8 Index (authors) *for* Citerri, R... .. .. *read* Ciferri, R.

Vol. 9 Index (species) *Fagus sylvatica:*
financial return *for* 2629 .. .. .. *read* 2638
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seed { *for* 1455 .. .. .. *read* 1457
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(4) p. 453 (No. 2592) for *Lithobalanus* .. .. read *Lithocarpus*
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Zabel, R. A., and
Foster, C. H. *add* 3078
(subject) Metal detectors *for* **2918** .. .. .. *read* **2818**
Thinnings, effect
on stream-flow *for* 4950 .. .. .. *read* 49–50
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Vol. 12 (1) p. 45 (No. 273) *for* No. 81, 1949 .. .. *read* No. *T*31, 1949
p. 114 (No. 766) *for* crown diameter 0·7 .. *read* crown length 0·7
(3) p. 390 (No. 2507) *for* nearest 10 in. .. .. *read* nearest 0·1 in.
(4) p. 462 (No. 2928) *for* (N.W. Netherlands) .. *read* (N.E. Netherlands)
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(species) *Abies* under *A. pindrow* .. .. delete (*A. webbiana*) 989
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flowering *for* 2665 .. .. .. *read* 2665–6
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Seed: production (and age of tree) .. .. *add* 2666
'Sour-felling' *for* 407.. .. .. .. *read* 409

Vol. 13 (1) p. 65 (No. 399) for *Zahuley* .. .. read *Zahnley*
for *C. L. McCall* .. .. read *G. L. McCall*
for *E. L. Roe* .. .. .. read *E. I. Roe*
p. 67 (No. 413) *delete* JAPAN .. .. .. *insert* SAWADA, K.
p. 108 (No. 817) *for* 4·6 to 7·0% .. .. *read* 46 to 70%
(2) p. 185 (No. 1307) for *H. W. Elwell* .. .. read *H. M. Elwell*
for *L. C. Engle* .. .. read *L. G. Engle*
(3) p. 281 (No. 2086) *for* BOGESS .. .. .. *read* BOGGESS
p. 293 (No. 2184) *for* 77 (4) .. .. .. *read* 30 (4)

Vol. 13 (3)	p. 308 (No. 2314)	*for*	P and Ca	*read*	P and the same amount of Ca
	p. 319 (No. 2416)	*for*	CARRUTHERS, T. F. S. ..	*read*	CARRUTHERS, J. F. S.
	p. 331 (No. 2527)	*for*	HANSEN	*read*	HANSSEN
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(5)	p. 476 (No. 3627)	*for*	22 (1/2)	*read*	21 (1/2)
	p. 488 (No. 3743)	*for*	1952	*read*	1949 (1951)
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	p. 522 (No. 3998)	*for*	(134–41 + 1 plate) ..	*read*	(135–41 + 1 plate)
	p. 524 (No. 4018)	*for*	MATTHYSE	*read*	MATTHYSSE
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	(No. 4404)	*for*	GARDINER	*read*	GARDNER
	Index (authors)	*for*	Bogess, W. R.	*read*	Boggess, W. R.
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	(species) *Fagus sylvatica:* mycorrhiza	*for*	1073	*read*	1033
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	(subject) QUARANTINE regulations	*for*	1355	*read*	1335
	(geogr.) Denmark: forest statistics	*for*	4452–3	*read*	4453
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Vol. 14 (1)	p. 27 (No. 165)	*for*	MCREADY..	*read*	MCCREADY
	p. 60 (No. 400)	*for*	No. 124	*read*	No. 1246
	p. 96 (No. 679)	for	*For. Abstr.* 12	read	*For. Abstr.* 13
(2)	p. 144 (No. 1005)	*for*	pp. 122	*read*	pp. 192
	p. 156 (No. 1117)	*for*	(1–3)	*read*	(1–13)
	p. 158 (No. 1136)	*for*	of seed source (*in title*) ..	*read*	of Red Pine seed source
	p. 165 (No. 1184)	*for*	established in 1943 ..	*read*	established in 1843
	p. 193 (No. 1420)	for	*Roux Archiv* 41	read	*Roux Archiv* 141
	p. 198 (No. 1460)	*for*	1952 (53–6)	*read*	1952 (33–6)
	p. 203 (No. 1500)	*for*	BAUMER, L.	*read*	BAUMER, M.
	(No. 1503) line 8 from end	*for*	changes in wood	*read*	charges in wood
	p. 222 (No. 1667) last line	for	*linearum*	read	*lineatum*
	p. 224(No. 1685)	*for*	ANDERSSON, E.	*read*	ANDERSSON, R.
(4)	p. 381	insert *Webbia* between *Xyleborus* and *Trypodendron* *delete* and *Webbia* after *Diapus*			
	p. 506 (No. 3975)	*for*	NEEBE	*read*	BEEBE
	Index (authors)	*for*	Andersson, E.	*read*	Andersson, R.
		for	—, Gustafson, Å., and Johnsson, H.	*read*	Andersson, E., Gustafsson, Å. etc.
		for	Arnold, W.	*read*	Arnoldt, W.
	Berthon, R.; Moreau, C. . .	*for*	3687	*read*	3487
		for	Borgo Billa, G.	*read*	Borgo Bilia, G.
	(species) *Fraxinus excelsior:* **wood** . . . (strength) *and* tool handles	*for*	731..	*read*	730
	(geogr.) Malaya: exotics	*for*	2123–4	*read*	2124–5
Vol. 15 (1)	p. 43 (No. 238)	*under* (5) *for* Ca phosphate ..		*read*	natural phosphatic chalk,
		and under (7) *for* liming ..		*read*	as (5) but
	p. 55 (No. 327)	*for*	Wi-Mar	*read*	Wi-Mab
(2)	p. 146 (No. 1065)	*for*	8·47 in.	read	0·87 in.
	p. 166 (No. 1263)	for	*E. prophnicia*	read	*E. propinqua*
	p. 178 (No. 1347)	*delete* 2- to 3-year			
	p. 203(No. 1572)	for	*cederanus*	read	*cedaranus*
		for	bark-shipping	*read*	bark-stripping
		for	*mashora*	read	*mashona*
	(No. 1573)	*delete* and the average . . . 33 ♀s			
	(No. 1574)	for	*Phyllocristis*	read	*Phyllocnistis*
	p. 231 (No. 1845)	*for*	DICKENSON	*read*	DICKINSON
	p. 254 (No. 2089)	delete *From author's summary*			
(3)	p. 292 (No. 2337)	*for*	MUCKADELL, M. S. DE ..	*read*	SCHAFFALITZKY DE MUCKADELL, M.
	p. 326 (No. 2615)	*insert author's name*			EVANKO, A. B.
(4)	p. 390 (last line)	*for*	[66]	*read*	[67]
	p. 429 (No. 3456)	*for*	SCHOENIKE, F. E... ..	*read*	SCHOENIKE, R. E.

altitude of 20m., 400–500 ha. at 30 m. (the most likely average altitude) and 600 ha. at 40 m. Tabulated figures are given showing seed/1000 ha., and its cost, labour force, wages and aircraft maintenance, working time, cost of burning and other soil preparation and total cost for sowing from aircraft versus drills by hand. Drill sowing is clearly more reliable, but it is unlikely that labour would be available for the large areas to be afforested in the immediate future.

423. SIRÉN, G. Lentokone metsän uudistamistyössä. **[Aerial forest sowing.]** *Metsät. Aikak.* 1954 (1), (17–20). 5 refs. [Fi.e.]

Cf. preceding abstract.

232.4. Formation of Stands by Planting

See also Nos. 355–7.

424. CLARK, T. G. **Survival and growth of 1940–41 experimental plantings in the Spruce type in West Virginia.** *J. For.* 52 (6), 1954 (427–31). 4 refs.

Pinus resinosa competes more effectively with herbaceous vegetation than *Picea rubens*, which fares better among the overtopping woody shrubs where the former does poorly and cannot survive without release. Of 7 treatments, burning the bracken gave best results for the Pine and poorest for the Spruce. Release from brush in the first year gives better survival in Spruce than later release, but light overtopping shade should be retained until plants are 4–6 ft. high. In soil pockets on rocky sites Red Spruce survived better than Southern Balsam Fir (*Abies fraseri*), but at 10 years, Fir is overtaking Spruce. Planting was better than sowing in these rocky sites but sowing is fairly successful with Fir. [Cf. *For. Abstr.* 13 (No. 1099).]

425. BURGERS, T. F. Repoblación con *Eucalyptus* en las sierras de Valverde y Zalamea, provincia de Huelva. **[Afforestation with *Eucalyptus* in the mountains of Valverde and Zalamea (Huelva province).]** *Montes, Madrid* 10 (57), 1954 (173–6). [Span.]

In earlier attempts (begun in 1929) to establish Eucalypts on these mountain sites *Eucalyptus globulus* made the best growth of the species tried, but on the whole the plantations were not very successful. The following variations in planting methods were tested: (1) Planting holes 0·4 m. square were spaced at 3 × 3 m. Transplants were planted with bare roots. Only the shallow-rooted species in the undergrowth were removed: deep-rooted species were left. The soil was worked over in spring. Results: 60% of the plants rooted. (2) As in (1), but all scrub was removed on sites that were not too expensive to clear. Results: 70% successful. (3) As in (2), but transplants in clay pots were used. Results: 90% successful. (4) Holes 0·3 m. square were spaced 3 × 3 m. Some transplants were planted with bare roots, others in pots. The soil was ploughed and wheat was sown. After the wheat harvest the soil was cleaned and the bigger plants earthed up. Results: 75% successful. Both (2) and (3) were satisfactory but growth was better in (4). In general, ploughing and pot planting is necessary and proves cheaper in the end. Competition from undergrowth must be eliminated, both in the early and later stages. The introduction of shade-producing species among the Eucalypts is a possible solution to this problem.

232.41. *Planting Stock* (*Type, Handling and Treatment*)

426. **Weeding and planting methods for *Tectona grandis*.** *Rep. For. Dep. Sudan 1952/53*, 1954 (39–41).

An experiment was laid out in Equatoria Division to investigate intensity of weeding, date of planting and type of plants in the establishment of plantations. The following conclusions are drawn. In the climatic conditions of the year 1952–3, Teak planted in June gave significantly better, and Teak planted in September significantly worse results, than that planted in July or August. Clean-weeded plots gave significantly higher survival and better growth, than strip- or patch-weeded plots but the differences between the two latter were not significant. When planted in June, stumps gave significantly better results than striplings, except in patch-weeded areas, where there was little difference. There was a significant interaction between date of planting and amount of weeding, in that the effect of the two factors combined was greater than would have been expected if they were considered separately. That is, while clean-weeding gave better results than other weeding methods in each month, the improvement due to clean-weeding was greatest with June and least with September plantings.

427. OSARA, N. A. Eräs kuusen istutus. **[A Norway Spruce plantation.]** *Commun. Inst. for. Fenn.* 40 (36), 1952. pp. 12. 4 refs. [Fi.e.]

Describes the successful use of 2 + 0 Spruce seedlings for planting out under dense forest cover which was then gradually removed. Seedlings were also planted successfully on open meadowland. Use of 2 + 0 seedlings represents a great saving in cost over the usual 2 + 2 transplants.

232.42. *Methods of Planting* (*including Use of Fertilizers etc.*)

See also Nos. 355, 417.

428. MORK, E., and BJØRGUNG, E. Forsøk med forskjellige plantemetoder for 4-årig omskolet gran. **[Investigation on different planting methods for 4-year transplanted Spruce.]** *Medd. norske Skogforsøksv.* 12 (3) (No. 43), 1954 (305–89). 9 refs. [Nor.nor.e.]

The methods tested were: hole planting against the vertical wall, with or without screefing and with or without an earth fill; hole planting with roots spread flat, the area first being screefed, and notch planting with a crowbar, both with and without earth fill; planting in an L-shaped notch made by the Grønland spade or in T-shaped notches made by ordinary spade or pick; and mound planting. The methods and tools used are illustrated. Results showing the effects on mortality and height growth of the various methods and the effect of planting by piece rates and day rates, and time studies and costs of the different methods are given in tables and graphs with English legends. In E. Norway, flat-root and vertical-wall planting gave the lowest mortality, with flat-root planting slightly but not

significantly the better. In N. Trøndelag there was no significant difference between the methods used; an earth fill should be used on extreme raw-humus sites. In Vardal (Oppland) and Brekken (S. Trøndelag), the Grønland spade and ordinary spade methods and notch-planting without a fill gave significantly higher mortality, and flat-root planting with screefing slightly lower mortality than the other methods used. Piece-rate planting with reliable workers gave as good results as day-rate planting. No significant difference was found between plant heights for the different methods. In the time studies, of the screefing methods vertical-wall planting was significantly quicker than flat-root planting, regardless of the size of the area screefed; if this area was small, vertical-wall planting came in the same group as the two T-notch planting methods. Of the non-screefing methods the time taken increased from notch planting without fill, through vertical-wall planting and Grønland spade planting to the two T-notch methods, the difference between the first three and the last two being significant. In E. Norway, notch planting with fill gave the lowest cost per living plant, and if the screefed areas were small, vertical-wall planting without fill was equally cheap. In Brekken and N. Trøndelag where mortality was low and differences between planting methods were slight, notch planting without fill was the cheapest method. There is a full English summary. Illustrations, graphs and tables have English legends.

429. CHAMPAGNE, E. G. **Wood chip mulch improves Red Pine survival.** *Sta. Note Cent. St. For. Exp. Sta.* No. 86, 1954. pp. 2.

P. resinosa 2 + 2 plants mulched with wood chips from logging slash showed 20% better survival after two growing seasons than untreated controls. They also showed better vigour (indicated by growth, colour, condition and needle length). Mulching had no significant effect on height growth.

430. KOVÁCS NAGY, Zs. A szovjetrendszerü csemeteültetögép a magyar erdögazdaságban. **[The Soviet tree-planting machine in Hungarian forestry.]** *Erdö* 1 (3/4), 1952 (180–2). [Hung.]

The author describes [but does not specify] the machine and its first Hungarian trials from personal experience. It is being used successfully in Czechoslovakia as well as Russia. It was drawn by a G–35 tractor using tracks on soft ground. The soil must be prepared carefully, by ploughing 3–4 weeks in advance (which allows the soil to settle) and also a few cm. deeper than the planting depth fixed. Despite drawbacks in operation, e.g. the clogging of the coulter by the longer-stalked weeds, or of the rake or compacting wheels in very weedy ground, the machine proved manifestly successful and will be re-tested soon, following modifications suggested by the author, e.g. the fixing of a disc-wheel in front of the coulter to slice up the weeds and replacing the rigid rake with a harrow that can be raised. The machine worked best on clean, friable soil, with plants (e.g. Grey Poplar, Robinia, Ash, Oak) having more rigid, less bushy root systems. In one test, under fairly adverse conditions, the machine planted 960 Grey Poplar/hour at ca. 1-m. spacing and 2·5 km./hour tractor speed. One machine is estimated to save ca. 200 working hours per day.

Eighteen machines incorporating the modifications suggested are being built in Hungary and should be ready by autumn, 1952, for use in planting on floodland in the Alföld.

232.43. *Spacing and Arrangement in Plantations*

431. BENNETT, F. A. **Reduction in growth of interplanted Slash Pine.** *Res. Note Stheast. For. Exp. Sta.* No. 55, 1954. pp. 2.

Slash Pine was planted on 2 sites at a spacing of 15 × 15 ft. and one year later was interplanted with more Slash Pine. Eight years after interplanting there were marked differences between the first planting and the interplanting in average d.b.h. (site 1 = 5·1 and 2·6 in., site 2, 4·9 and 2·8 in.), height ((1) 27·6 and 19·1 ft., (2) 29·7 and 21·3 ft.) and in survival.

432. MATHAUDA, G. S. **The influence of initial spacing on early mortality and growth in the *Casuarina* [*equisetifolia*] plantations at Balukhand, Puri division, Orissa.** *Indian For.* 80 (8), 1954 (446–52 + 3 gphs.). 16 refs.

Trial plots at 6-, 9-, and 12-ft. square planting have been under observation since 1941. Statistical analysis of the data for 1941–8 indicates that the increase in spacing from 6 to 9 ft. significantly reduces mortality and accelerates diameter increment; the further increase from 9 to 12 ft. does not produce significant differences. It is concluded that 9 × 9 ft. spacing is the optimum up to the age of 7 years.

232.44. *Season and Time of Planting*

See also No. 426.

433. BLÖNDAL, S. Á hvaða tíma er best að gróðursetja trjáplöntur? **[What is the best planting season?]** *Ársr. Skogræktarf. Íslands* 1954 (41–4). 1 ref. [Ice.]

Norwegian experiments on Norway Spruce [see *For. Abstr.* 13 (No. 3806)] are discussed and on the basis of the results and of a study on distribution of rainfall in Iceland, recommendations are made for planting season in that country.

233. *Afforestation*

See also Nos. 215, 340, 379–82, 425, 457, 459, 607, 612, 1296, 1306 *et seq.*

434. HORVÁTH, O. A. A Mecsekhegység fitocönológiai viszonyai és a fásítás. **[The forest vegetation of Mt. Mecsek and afforestation.]** *Erdö* 2 (1), 1953 (66–70, 111–2). [Hu.e.]

A detailed report on the forest phytocoenoses of the whole of Mt. Mecsek, based on 150 surveys. Tables list the shrubs and trees forming the natural forest associations. For the afforestation of barren sites the author recommends (in addition to *Pinus nigra*) species found in the associations described under the names *Querceto-Cotinetum* and *Querceto-Lithospermetum*. Owing to human interference the stands of *Quercus cerris*, described by Hungarian authors under the name *Querceto-Potentilletum*, have extended their area, though their increase is not

desirable from the point of view of modern forestry. The same may be said of the so-called *Carpinetum*, which should, for the most part, be replaced by Beech stands of the so-called *Fagetum*. *From author's summary.*

435. BONTAY, F. Néhány szempont a Dunántúl fenyvesítési feladataihoz. **[The task of afforestation with conifers in Trans-Danubia.]** *Erdö* 2 (1), 1953 (58–65, 111). 5 refs. [Hu.g.]

Discusses the possibilities of Spruce, Larch and *Pinus strobus*, their silvicultural characters and site requirements. Data are presented on the climate of the region and its suitability for these species. The author emphasizes the importance of collecting climatic data covering some length of time when making a choice of species for a certain site. *From author's summary.*

436. LINGUET, A.-R. Critères du choix des essences et des méthodes de reboisement à l'usage des reboiseurs de Sologne et du Quercy. **[Choice of species and methods for use in the reforestation of Sologne and Quercy.]** [*Pap.*] *8th int. bot. Congr. Paris, Sect. 13* 1954 (48–51). [F.] X.

Presents a table showing the ecological characteristics of different types of site in these two regions of France and the species and methods being used in, or recommended for reforestation.

437. WIDMAN, M. **Afforestation techniques in Southern Mediterranean France: progress report on research work and experiments.** [*Docum.*] *4th Sess. FAO Jt. Subcomm. Medit. For. Probl.* No. *FAO/CEF/SCM/45-A*, 1954. pp. 11. [E.]

438. MICHEL, A. B. A. Observations sur l'évolution des landes et terres abandonées sur sol siliceux en montagne méditerranéenne. **[The evolution of 'landes' and abandoned sites on siliceous soils in Mediterranean mountain regions.]** [*Pap.*] *8th int. bot. Congr., Paris, Sect. 13* 1954 (52–5). [F.] X.

Notes on the development of vegetation in areas of the eastern Pyrenees which are now protected from grazing, with a discussion of ways in which this vegetation will affect future afforestation.

439. MARKOVIC, L. Rapport sur les reboisements et leurs techniques en Yougoslavie. **[Report on progress and technique of afforestation in Jugoslavia.]** [*Docum.*] *4th Sess. FAO Jt. Subcomm. Medit. For. Probl.* No. *FAO/CEF/SCM/45-C*, 1954. pp. 4. [F.]

440. KARSCHON, R. Techniques de reboisement en Israel. **[Afforestation techniques in Israel.]** [*Docum.*] *4th Sess. FAO Jt. Subcomm. Medit. For. Probl.* No. *FAO/CEF/SCM/45-B*, 1954. pp. 6. [F.]

441. U AUNG DIN. **An outline scheme for the afforestation and development of village-forests in the dry zone [of Burma].** *Burmese For.* 4 (1), 1954 (47–65).

Includes a list of recommended species (*Acacia catechu, A. leucophloea, A. decurrens, A. d.* var. *mollissima, Albizzia lebbek, Cassia auriculata, C. siamea, Dalbergia sissoo, Melia azedarach, Prosopis juliflora*, and *Eucalyptus* spp.).

442. MÉTRO, A. Note sur les techniques de reboisement au Maroc. **[Note on afforestation techniques in [French] Morocco.]** [*Docum.*] *4th Sess. FAO Jt. Subcomm. Medit. For. Probl.* No. *FAO/CEF/SCM/45-D*, 1954. pp. 24. [F.]

443. AUSTIN, T. Skogreisingen i Norges kyststrøk. **[Afforestation in the coastal areas of Norway.]** *Metsät. Aikak.* 1954 (6/7), (219–22). [Nor.fi.e.]

Discusses the programme for afforestation along the coast (about 1300 km. between lat. 58° and 70° N.), work already carried out, the provision of plants and seed, and estimated costs and timber yield.

444. THAARUP, P. **The afforestation of the sand dunes of the western coast of Jutland, Denmark.** *Advanc. Sci.* 11 (41), 1954 (38–41).

Discusses the development of sand-dune planting since 1539, the value and characteristics of the main species used (*Pinus mugo, P. sylvestris, P. contorta, P. nigra, Picea sitchensis* and *Abies alba*), and costs and yields. [Cf. *For. Abstr.* 15 (No. 2484).]

445. MACDONALD, J. **Tree planting on coastal sands in Great Britain.** *Advanc. Sci.* 11 (41), 1954 (33–7). 11 refs.

A review of progress.

446. TROUP, L. C. **The afforestation of chalk downland.** *Forestry* 27 (2), 1954 (135–44). 2 refs.

The downland scene is described with particular reference to the South Downs of Sussex and Hampshire. An outline is given of the topographical, climatic, and soil factors which influence the choice of species and methods of afforestation. The soil changes which take place under the influence of humus are discussed and related to types of vegetative cover. Beech is the main tree species favoured and methods of raising this tree are considered for the various sites available. The preparation of the ground for planting may necessitate complete or partial cultivation or the thinning of existing cover. Methods of doing this are described. *From author's summary.*

447. HORVAT, A. Osvrt na rezultate pošumljavanja u krškom području na Hrvatske u periodu izvršenja petgodišnjeg plana. **[Review of the results of afforestation in the Croatian karst area during the Five-Year Plan [1947–51].]** *Šum. List* 78 (2/3), 1954 (51–61). 6 refs. [Croat.f.]

Ca. 26,000 ha. of karst were afforested, ca. 11,000 ha. successfully. The main species used were: *Pinus halepensis, P. nigra, P. sylvestris, Picea abies, Quercus cerris, Q. ilex, Q. lanuginosa, Fagus sylvatica*, and *Robinia pseudoacacia*, the conifers being used over ca. 60% of the area. The methods were planting and sowing in pits, and broadcast sowing.

448. SCHRAMM, J. R. **Plant colonization of black anthracite-mining wastes.** [*Pap.*] *8th int. bot. Congr. Paris, Sect. 7* 1954 (233–4). X.

The failure of plants to colonize anthracite wastes in Pennsylvania is due to the excessively high temperature of the soil during the growing season. The wastes, being black, absorb so much radiant energy that the surfaces, when dry and fully insolated, reach lethal temperatures. This factor can be controlled by partial shading or by covering the soil with light-coloured materials. Some species

such as *Betula populifolia*, *Comptonia peregrina*, *Robinia pseudoacacia*, *R. hispida* and 4 or 5 *Pinus* spp., will grow reasonably well if protected in this way during emergence and early life.

449. KNUDSEN, L. L. **A Pine planting on old strip-mine banks.** *For. Mimeo. Ohio agric. Exp. Sta.* No. 5, 1953. pp. 2.

A 17-year-old plantation of *Pinus resinosa* and *P. sylvestris* in Muskingum County shows that in certain circumstances Pines can be grown successfully on spoil banks.

450. AGOSTINI, R. L'influenza del rimboschimento del 'Monte Nuovo' (Campi Flegrei) sul processo evolutivo della vegetazione. **[The influence of afforestation of the Monte Nuovo on the evolution of its vegetation.]** *Monti e Boschi* 5 (7), 1954 (312–22). 3 refs. [It.f.e.]

The vegetation on this volcanic cone, formed in 1538, is still evolving. A plantation of *Pinus pinea* made in 1939 on part of the area, has greatly accelerated this evolution. The Pine now has an abundant understorey of *Quercus ilex*, *Phillyrea* sp., *Erica arborea* and *Calycotome villosa*, and appears to be evolving towards a *Q. ilex* climax.

451. HOLUPJAK, K. L. Drevesnaja rastiteljnostj v borjbe s ovragami. **[Woody vegetation in gulley control.]** *Priroda, Moskva* 43 (6), 1954 (97–101). [Russ.] A.P.B.

A semi-popular review, laying special stress on the necessity of proper consideration of site, woody species, and stand constitution and lay-out as variables. Emphasizes particularly the danger of tall trees at gulley edges or on narrow gulley bottoms where their root action may aggravate erosion by providing rapid vertical drainage channels and by loosening the soil through leverage effects due to the weight and movements of the crown. In such situations root-suckering shrubs plus some root-suckering trees, e.g. Robinia and Aspen, should be used.

234. *Formation of Forest by Natural Succession*

See Nos. 366, 453, 607, 612.

235. *Underplanting, Advance Planting etc. Nurses and Formation of Mixtures. Interplanting of Inferior Growth*

See also Nos. 293, 339–40, 356, 1268, 1275–7.

452. **[Underplanting in Bamboo forest.]** *Rep. For. Dep. Sudan 1952/53*, 1954 (22).

The fact that growth of *Cupressus* and *Callitris* when planted on grassland is so much better than when planted under Bamboo confirms the belief that *Oxytenanthera abyssinica* is a greedy feeder and restricts growth of trees near it. Originally Bamboo forest had been left uncleared when underplanted with trees, in order to give shade and prevent grass competition; it is now being cut before planting.

453. PIERLOT, R. *Eucalyptus* et reboisement au Kivu. **[Eucalypts and reforestation in Kivu, [Belgian Congo].]** [*Proc.*] 1*st Conf. for. interafric., Abidjan 1951*, 1952 (413–26). 7 refs. [F.e.]

Details a scheme for using Eucalypts under coppice-with-standards to lead over to the re-establishment of the local montane forest. An association table is given of an 18-year, 30-m.-high, *Eucalyptus saligna* plantation established by direct sowing in a gulley-eroded pasture, to show the invasion of indigenous species. The prescriptions proposed are: planting *Eucalyptus* at 2 × 2 m.; reduction to 250 dominants/ha. at 4–5 years; subsequent thinning every 3–4 years leaving 100 standards/ha. at 15 years, when light-crowned, wind-firm, easily recruited, indigenous species of known value will be introduced (*Entandrophragma* spp., *Syzygium guineense*, *Symphonia globulifera*, *Carapa grandiflora*, *Piptadenia buchananii*, *Lebrunia bushaie*, *Podocarpus* spp.), planted at 1·5 × 1·5 m., in groups of at least 20 ares; the overwood to be completely removed in three fellings by the 25th year.

236. *Care of Regeneration or Plantations in the Initial Stages of Establishment (including Regeneration Surveys)*

See also Nos. 336, 424, 426, 588.

454. VINCENT, A. B. **Release of Balsam Fir and White Spruce reproduction from shrub competition. Project M-417.** *Silv. Leafl. For. Br. Can.* No. 100, 1954. pp. 4.

Removal of shrubs (almost entirely *Acer spicatum*) by axe from a circle 3 ft. in radius round each Spruce and Fir stem in a 1-acre plot in a young mixed stand, gave a distinct increase in height growth. Treatment of 1 acre took 44 man-hours and the method would be too expensive for general use.

455. **[Watering of *Eucalyptus microtheca*].** *Rep. For. Dep. Sudan 1952/53*, 1954 (36–7).

Experiments were made in the Gezira with different durations and frequencies of watering of *E. microtheca* planted out at various dates in August. These showed that though generally better results are obtained by continuing watering until the end of March, it is possible to establish a reasonable plantation by watering only until the end of December. A break of watering in October caused no great damage.

456. DOUAY, J. Appréciation des possibilités de régénération d'une parcelle de forêt tropicale par comptage des préexistants. **[Determining the possibilities of regeneration on tropical forest plots by enumeration of advance reproduction.]** *Bois For. Trop.* No. 36, 1954 (11–9). 4 refs. [F.f.e.span.]

Describes the method of linear regeneration sampling developed in Malaya [cf. *For. Abstr.* 12 (No. 1114)] and its application to tropical African conditions in the Gold Coast [cf. *For. Abstr.* 15 (No. 1666)] and Nigeria.

237. *Amelioration of Forest Sites*

See also Nos. 212–3, 215, 380–2, 400, 574–5, 807.

457. LUKKALA, O. J. Kokemuksia Jaakkoinsuon koeojitusalueelta. **[Experiences from Jaakoinsuo experimental drainage area.]** *Commun. Inst. for. Fenn.* 39 (6), 1951 (1952). pp. 53. [Fi.e.]

Reviews the findings of nearly 50 years' observations on the results of draining a peat bog. Among aspects covered are the thinning of the peat layer, changes in ground vegetation and in groundwater level, development of sample stands, effect of thinning, natural regeneration, and liming and fertilizer experiments. All graphs and tables have English as well as Finnish legends.

458. SARASTRO, J. Metsäojituksen aiheuttamista aluskasvillisuuden muutoksista eräissä suotyypeissä. [**Changes in the ground vegetation of some marsh types following forest drainage.**] *Commun. Inst. for. Fenn.* 40 (13), 1952. pp. 32. 15 refs. [Fi.G.]

459. MULTAMÄKI, S. E. Suo metsän kasvupaikkana. [**Swamps as a habitat for forests.**] *Commun. Inst. for. Fenn.* 40 (27), 1952. pp. 13. 20 refs. [Fi.e.]

Discusses the possibilities of swamps in Finland for afforestation. The nutrient contents of the soils are satisfactory, and most swamps can be afforested after drainage.

460. DITTMAR, O. Eine mathematisch-statistische Auswertung zweier Düngungsversuchsreihen auf armen Talsanden des nordostdeutschen Diluviums. [**A statistical appraisal of two fertilizer trials on poor valley sands of the NE German drift.**] *Arch. Forstw.* 2 (6), 1953 (552–86). 10 refs. [G.g.]

Discusses the lay-out, amenability to statistical analysis and significant results of lime-marling and of fertilizing poor Pine sites with blast-furnace slags and basalt [? quarry wastes]. The author considers conventional plot lay-outs unsuitable in forestry and suggests that 3–5 replications should be randomized over the whole area in plots of 0·1 ha. with 2 m. surrounds. Variance analysis shows that until near closing of the canopy the mean height of treated plots (ignoring edge plants) provides an accurate criterion for results in fertilizer trials.

238. *Timber Plantation Crops requiring Special Treatment*

See No. 329.

24. TENDING OF STANDS AND TREES

461. ALDRIDGE, F., and HUDSON, R. H. **Growing timber quality Ash.** *Quart. J. For.* 48 (3), 1954 (210–4).

Emphasizes the importance of growing Ash and other ring-porous hardwoods fast (6–7 rings/inch) for maximum strength, and pruning in order to obtain straight-grained stems. Crown length should be at least half the height of the tree, and rotations of 60–70 years are advisable.

241. *Cleanings*

See No. 336.

242. *Thinnings*

See also Nos. 116, 336, 457, 638.

462. HUMMEL, F. C. **Forestry practice in Great Britain: thinning methods and yields.** *Wood* 19 (6–7), 1954 (241–3; 292–3).

463. HEIBERG, S. O. [Compiler]. **Thinning problems and practices in Denmark.** *Tech. Publ. N.Y. St. Coll. For.* No. 76, 1954. pp. 92. 3 pp. of refs. Price $0·80.

Contains the following papers: The influence of thinning on volume increment—(1) results of investigations, (2) ecological and physiological investigations (*C. M. Möller*); Denmark as an international testing area (*C. M. Möller*); The 'wait and see' method of thinning, in which thinning is light until about 50 years (*J. Abell*); The 'active' method of thinning, in which thinning is heavy from 15–20 years (*T. Jagd*); and Selection thinning in Denmark (*F. Juncker*); also yield tables for Beech and Norway Spruce.

464. HENRIKSEN, H. A. Tyndingshugstens betydning for tilvækst, sundhed og driftens stabilitet i hedeplantager i Jylland eksperimentelt belyst. [**The significance of thinning for increment, health and stability of management in heath plantations in Jutland, examined experimentally.**] *Metsät. Aikak.* 1954 (6/7), (227–30, 233). [Dan.fi.e.]

Summarizes results in 1951 of experiments begun in 1932 on the effect of different grades of thinning in a stand of Norway Spruce planted in 1893. Data given include the condition of the stand in 1951, the volume of wood removed, annual increment, stem form, wood quality and attack by *Fomes annosus* [cf. *For. Abstr.* 15 (No. 3728)]. Conclusions are that lighter thinnings are needed on better sites and that optimum tree growth on the best sites may be reached even without thinning.

465. NYYSSÖNEN, A. Hakkauksilla käsiteltyjen männiköiden rakenteesta ja kehityksestä. [**On the structure and development of Finnish Pine stands treated with different cuttings [thinnings and selective fellings].**] *Prepr.* from *Acta for. fenn.* No. 60, 1954. pp. 194. 232 refs. [Fi.fi.e.]

A further study of the stands already investigated [cf. *For. Abstr.* 13 (No. 550)] showed that the volume increment in repeatedly thinned stands easily reached the level of that in normal natural (unthinned) stands though their growing stock steadily fell behind that of the latter. It was also found that, provided the volume removed is the same, the size of the trees removed has no material effect (within certain limits) on the volume increment of the stand. It is thus theoretically possible to favour the qualitatively best trees in a stand, irrespective of size. But it is pointed out that every cutting removing the largest trees may have the effect of prolonging the rotation. There is a 20-page English summary and the legends to graphs and tables are given in English as well as Finnish.

466. MORAIS, R. **Research project No. 14. Thinning in Balsam Fir stands 40 to 50 years of age.** *For. Res. Note Causapscal For. Exp. Sta.* No. 4, 1954. pp. 2.

An experiment was made in thinning dense stands of *Abies balsamea* (up to 4000 trees/acre above 0·5 in. diam.): (*a*) keeping best and largest trees and removing competitors, (*b*) removing mainly the larger, merchantable trees, (*c*) intermediate between (*a*) and (*b*). Preliminary financial analysis of the data tends to establish the superiority of (*a*).

243. *Opening of the Canopy (Increment Fellings, Overhead Release and Improvement Fellings)*

See also Nos. 342, 614.

467. Sirén, G. Hakkuun vaikutuksesta kuusipuun rakenteeseen korpimailla. **[The effect of release cutting on wood structure of Spruce on peat moors.]** *Commun. Inst. for. Fenn.* 40 (32), 1952. pp. 36. 75 refs. [Fi.e.]

A study was made of seed trees of *Picea abies* after release fellings on wet peat moors. Width of annual rings after release was greatest in the butt region and not, as is normal, in the upper part of the stem. At the same time, annual increment was diminished in other parts of the stem, causing in most cases a decrease in the form factor. Increased growth begins after a period (2–5 years) of adaptation, lasts about 10 years, and begins in the lower part of the stem. Other results of release were an increase in the % of late wood, in sp. gr., and in number of tracheids, in the lower part of the stem (5–7 m.). Release also affected both root system (mainly in the diameter of greater density) and foliage (inhibition of elongation, shedding of old needles, and appearance of new, dense foliage).

245. *Tending of Trees, Pruning etc.*

See also Nos. 116, 461, 803.

468. Zehetmayr, J. W. L. **Experiments in the economics of brashing with special reference to some problems in experimental technique.** [*Pre-issue*] *Proc. Congr. int. Union For. Res. Organ., Rome 1953*, Section 32 (No. 3/1), 1953. pp. 5. [E.] Limited distribution.

Results of some experiments on the effects of brashing on costs of subsequent thinning in conifers in Scotland and Yorkshire were inconclusive, mainly because of site factors, difficulties in equating working times and skill, and inadequate control of the thinning experiment, but they suggest that partial brashing may be preferable to complete brashing and that systematic lane and line methods might be given further trial.

469. Dahms, W. G. **Growth of pruned Ponderosa Pine.** *J. For.* 52 (6), 1954 (444–5). 4 refs.

At the end of the second quinquennium [cf. *For. Abstr.* 9 (No. 2218)] the diameter growth for live-crown reductions of 0, $\frac{1}{4}$, $\frac{1}{2}$ and $\frac{3}{4}$ was as 100 : 97 : 82 : 46. During this second period recovery for the $\frac{1}{4}$, $\frac{1}{2}$ and $\frac{3}{4}$ has been 100, 13 and 19% respectively. Height-growth ratios for these treatments are 100 : 98 : 94 : 90, with no significant evidence of recovery but with a tendency to loss of dominance increasing with the severity of pruning. *Pinus ponderosa* should not be pruned to remove more than $\frac{1}{8}$ of crown length, nor should this be reduced to less than $\frac{1}{3}$ of the total tree height.

470. Holck, C. E. Hvor højt bør opstamningen føres i Douglas? **[How high up the stem should pruning be carried in Douglas Fir?]** *Dansk Skovforen. Tidsskr.* 38 (10), 1953 (589–604). 3 refs. [Dan.]

From measurements of 100 unpruned trees and some supplementary measurements of thinnings, in the Langesø forest district, Denmark, a taper diagram is constructed for tree radii up to 38 cm. and total heights up to 33·5 m., showing the corresponding pruning heights that would leave the safe crown ratio of $\frac{1}{2}$. With this crown ratio and a rotation of 60–70 years (final d.b.h. 60 cm.), assuming that the knotty core and wood affected by occlusion would have a radius of 7·5 cm. at both butt and top of the pruned length, and that a radial width of 16 cm. of clear timber must be formed at the top by the end of the rotation, it would be possible to prune up to 8 m. The requirement of equal radius of knotty core at butt and top of the pruned length is important in log breakdown at the mill. Some results are given from a time study of pruning with different tools and equipment (hand saw, pole saw, bark spud on 2·5 m. pole, hand saw and ladder) to heights varying from 2 to 10 m. (mostly on Douglas Fir but also on some other conifers). These show a large saving from pruning the first 4 m. in one instead of two operations. Up to 4 m. the pole saw proved much quicker than hand saw and ladder; the bark spud was also efficient as regards time and is worth further trials. The figures obtained are used to estimate costs per tree and costs with interest, to a rotation age of 65 years, per ha., per cu.m. total round timber and per cu. ft. clear sawn timber. Results indicate that even pruning to 12 m. should pay well under the assumptions made. Pruning above 8 m. will mean that above this point the knotty core cannot be restricted to the same radius, but may still be advantageous in many cases up to 10 m.; pruning to 12 m., however, is unlikely to be a sound proposition unless a reliable market exists at a sawmill specializing in small stock. The final recommendation is 3- or 4-stage pruning: (1) 0–4 m. when dominants reach 10 cm. d.b.h. (pruning $\succ$ 1000 trees/ha.); (2) 4–6 m. at 14 cm. d.b.h. (600 trees/ha.); (3) 6–8 m. at 16 cm. d.b.h. (400 trees/ha.); and (4), as soon as possible thereafter, but only if height and thriftiness of the plantation allow, 8–10 m. (300 trees/ha.).

26. COMBINATIONS OF FORESTRY WITH AGRICULTURE AND PASTORAL HUSBANDRY (INCLUDING SHELTERBELTS AND THEIR TREATMENT)

See also Nos. 1306 *et seq.*

471. Příručka agrolesomeliorátora. **[Reference manual on forestry for erosion control and for the improvement of agricultural areas.]** *Lesn. Knihovna (velká Řada)* 1953. pp. 291. [Cz.] Price *Kčs.*30·70.

Translated from the Russian original *Spravočnik Agrolesomelioratora*, Moscow, Selhozgiz, 1948. Includes the following sections: (1) formation of forest stands for the protection of agricultural land (deals with forest shelterbelts, erosion processes, and their control on plains and in mountainous districts); (2) improvement of sands (fixation, afforestation, agricultural use); (3) forest seeds; and (4) nursery practice. Other sections deal with parks and verdure in human settlements, with the cultivation and use of Willow, and with the protection of nurseries and plantations against pests and diseases.

261. *Alternate Forestry and Agriculture, Periodic or Temporary Agricultural Use of Forest Land*

See also Nos. 316, 607, 1268 *et seq.*, 1294.

472. GRONDARD, A. Équilibre entre les formations forestières naturelles et les cultures itinérantes des autochtones. **[Balance between natural forest and shifting cultivation [in the Chad Territory].]** [*Proc.*] *1st. Conf. for. interafric., Abidjan 1951*, 1952 (327–32). [F.e.]

Covers the optimum duration of the fallow; the disastrous consequences of unbalance; methods of application to give the fallow its full efficiency and instances from the Chad Territory (mainly in savannas and with cotton as export crop).

262. *Fuel and Fodder Forests*

473. **[Age of exploitation of fuel plantations.]** *Rep. For. Dep. Sudan 1952/53*, 1954 (27).

In fuel-cutting areas it is becoming standard practice to fell before the trees are mature and to leave seedbearers. These areas are burned as soon as possible after the ensuing rainy season. With *Acacia seyal* and *Zizyphus spina-christi* the result is a dense crop of coppice and seedlings that grow away rapidly, in contrast to clear-felling of mature *A. seyal*, which results in the forest being replaced by grassland for an indefinite period. In forests of *Dalbergia melanoxylon*, *Mitragyna inermis* and *Cordia gharaf* results are slower but the treatment does ensure continuance of forest growth.

474. CORBET, H. A. **Fodder trees: suggestions for their wider use.** H. A. Corbet, 44 Angelo St., South Perth, Australia. 2nd ed., 1954. pp. 20. 36 refs. Price 5*s*.

Cf. *For. Abstr.* 13 (No. 2143).

475. **[Suitability of *Acacia cyanophylla* as a fodder plant.]** *Rep. For. Dep. Cyprus 1953*, 1954 (25).

Sheep-grazing trials carried out in *A. cyanophylla* plantations showed that this Acacia was palatable to sheep, though in steadily diminishing degree, when not supplemented by other types of grazing. Goats grazed it more closely than sheep. Acacia hay (mainly dried phyllodes) was palatable to both sheep and goats.

266. *Shelterbelts, Windbreaks*

See also Nos. 50, 83, 451, 653, 1306.

476. GEORGE, E. J. **Some silvicultural problems of the northern Great Plains.** *J. For.* 52 (7), 1954 (511–4).

Cf. *For. Abstr.* 15 (No. 291).

477. GLOYNE, R. W. **Some effects of shelterbelts upon local and micro climate.** *Forestry* 27 (2), 1954 (85–95). 22 refs.

Attention is drawn to recent work on wind and shelter and a comprehensive list of references is given. Diagrams illustrate the main effects of barriers on the flow of air and these effects are discussed. The author then considers shortly the influence of wide tree belts on wind and their other effects such as shade, temperature, and humidity, as they present practical problems to the hill farmer. A diagram gives the isopleths of annual mean wind speed for the British Isles together with corresponding data for individual hill sites. This diagram provides a rough estimate of those regions where shelter would seem a necessity. *Author's summary.*

478. JUDIN, M. I. Vlijanie lesnyh polos na turbulentnyĭ obmen i optimaljnaja širina polos. **[Effect of shelterbelts on turbulent exchange, and the optimum shelterbelt width [depth].]** *Dokl. Akad. Nauk SSSR* 71 (4), 1950 (655–8). 6 refs. [Russ.] A.P.B.

The reduction of soil evaporation and of the coefficients of plant transpiration, as well as the reduction of snow-blowing in winter and of the topsoil in the spring, observed in the vicinity of shelterbelts, depends on reduction of the wind velocity only because this reduced velocity corresponds to a less intense turbulent mixing of air molecules, thus causing a decrease in the vertical turbulent transport of water vapour, snow, dust etc. When an air mass in motion reduces its velocity, its transverse section is increased and the current becomes unstable; this intensifies the process of transformation of the energy of motion into the energy of disordered turbulent motion (the diffusor effect). The main factor in shelterbelt protection is the structural change occurring in the air current when passing through it. Large eddies disappear, while a number of small eddies are formed, thus causing a great reduction of the 'effective dimension of eddies', and hence a decrease in vertical exchange. The optimum depth of shelterbelts (in metres) is calculated as $\frac{1}{2\alpha}$ where α is a coefficient varying from 0·02 to 0·06 (for very permeable and permeable shelterbelts). Hence the optimum depth should vary from 25 to 8 m.

479. ROLLER, K. Áttörtségi tényezö figyelembevétele a mezövédöerdösávok szerkesztésénél. **[The penetrability factor in shelterbelts.]** *Erdö* 2 (3), 1953 (274–82, 295, 298). 9 refs. [Hu.russ.f.]

Using some Russian data on penetrability to wind, the writer divides Hungary into three zones on the basis of mean annual and mean summer precipitation plus mean annual temperature. He briefly indicates the shelterbelt lay-out appropriate for each.

480. STEUBING, L. Experimentelle Untersuchungen über die Veränderung der Standortsfaktoren durch Windschutzanlagen. **[Experimental studies on the modification of site factors by shelterbelts.]** *Oikos* 4 (2), 1952/53 [1954] (118–47). 39 refs. [G.g.]

Studies were made in the neighbourhood of Berlin, on the Havelland marshes, where an area of some 600 ha. is divided up by 70-year-old belts of mixed trees and bushes, some 5–6 m. high and of about the same depth, and situated 300–500 m. apart. The data are presented in tables and graphs and may be summarized as follows: Permeable belts diminish wind velocity for a distance of 10–12 times their height. The fall of both rain and snow increases in the lee of the belts, and soil moisture is correspondingly higher in the protected zone. The

difference in total dewfall and position of maximum dewfall, between open and protected zones is predominantly influenced by strength of wind and cloud cover [cf. *For. Abstr.* 14 (No. 349); 15 (No. 288)]. Conditions are specially favourable to fog drip on the windward side of a shelterbelt. Relative humidity is usually higher and evaporation lower in the protected zone than in the open, but in some circumstances this relation can be reversed. Accumulations of CO_2 in the air may occur to the lee of shelterbelts over bare ground that has had heavy applications of organic manures. Root competition from shelterbelts and its effects on field crops are discussed.

481. BJARNASON, H., and BLÖNDAL, S. Skjólbelti og ræktun. **[Shelterbelts and crops.]** *Ársr. Skogræktarf. Íslands* 1954 (30–40). [Ice.]

Discusses data from other countries on the effects of shelterbelts on climate and crops. In Iceland, shelterbelts are too young for much information to be available. At Akranes, a 300-m. belt consisting of one row each of two Willows [*Salix phylicifolia* and another *Salix* sp.], of Birch and of *Sorbus* [*aucuparia*?] has been planted on the earth thrown up from drainage ditches. At 10 years old the belt is 2–3 m. high, with the *Sorbus* sp. showing poorest growth. Planting of such belts along the many drainage ditches is recommended. Other species, e.g. *Populus trichocarpa*, *Picea sitchensis* and *P. glauca*, may be tried in the shelter of the original belt after a few years. Shelterbelts should be kept free from grass during the early years.

268. *Pastured Forests. Grazing on Forest and Open Ranges. Forage Plants etc.*

See also Nos. 322, 606, 664, 1268, 1272, 1280–1.

482. REID, V. H. **Multiple land use: timber, cattle, and bobwhite quail.** *J. For.* 52 (8), 1954 (575–8). 12 refs.

A detailed argument to show that with proper co-ordination timber and cattle can be grown together on Longleaf Pine land, of which there are ca. 15–20 million acres in the South. Fire is used both by foresters and graziers in this management and judiciously used fire can be beneficial in these woods for quail (*Colinus virginianus*) also.

27. ARBORETA. ARBORICULTURE FOR ORNAMENTAL PURPOSES. HEDGES AND HEDGE PLANTS

See also No. 471.

483. PAVARI, A. Un importante centro di studi dendrologici: l'Arboretum Taurinense. **[The Arboretum Taurinense at Turin.]** *Monti e Boschi* 5 (8), 1954 (339–49). [It.f.e.]

484. LAING, E. V. **Arboriculture [in Scotland], 1854–1953.** *Scot. For.* 8 (3), 1954 (103–13).

Notes on introductions of exotic species, changes in nomenclature, care, and diseases.

485. GELDARD, N. **Planting forest trees for beauty.** *Quart. J. For.* 48 (3), 1954 (179–83 + 6 photos).

486. WINTERS, H. F., and ALMEYDA, N. **Ornamental trees in Puerto Rico.** *Carib. For.* 14 (3/4), 1953 (97–105).

An annotated list of species suitable for Puerto Rico, including Palms, Bamboos and evergreens.

487. MARTORELL, L. F. ¿Qué árbol sembraré? **[What tree shall I plant?]** *Carib. For.* 14 (3/4), 1953 (152–60). 6 refs. [Span.]

Discusses the suitability of certain species for planting in gardens or on estates and presents a list of species classified according to their uses, i.e. for shade, ornament, fruit or timber production.

28. HUSBANDRY OF FOREST PRODUCTS OTHER THAN WOOD

See also section 892.

282. *Bark Crops*

See also Nos. 328, 361, 366, 371.

488. TICCHIONI, M. Cenni statistico-economici sulle sugherete in Italia. **[Data on cork production in Italy.]** *Monti e Boschi* 5 (7), 1954 (291–9). [It.f.e.]

Gives areas of Cork stands (high forest, coppice, and coppice with standards) and production, by regions, and prices (at home and abroad) for different qualities of cork, from 1947 to 1953.

283. *Fruit and Seed Crops*

See also No. 357.

489. DUGELAY, A. Le problème de l'olivier. **[The problem of the Olive.]** *Rev. for. franç.* 6 (7), 1954 (444–62 + 4 photos). [F.]

Discusses the regression of Olive-growing in France, and its dangers from the point of view of soil conservation in an area always menaced by erosion, and where Olive orchards have for centuries been the only form of tree cover.

284. *Crops Tapped for Exudations*

490. MEŠTROVIĆ, R. Smolarenje na kršu. **[Resin-tapping in the karst areas.]** *Šum. List* 78 (2/3), 1954 (75–82). [Croat.croat.]

Resin production in Dalmatia rose from 10 tons in 1946 to 175·6 tons in 1953. Both theoretically and practically, there are no limits to further development. The main species tapped are *Pinus halepensis* and *P. nigra*. Chemical stimulation trials were started in 1953 in two localities, with 1000 and 600 *P. halepensis* trees, respectively, using HCl (40%) and H_2SO_4 (40%), on French faces. The tapping season lasts from mid-April until the end of October (195 days), with freshenings every 3 days. The 65 freshenings produced a face ca. 45 cm. high and 7 cm. wide. Five variants (each with two sub-variants) of the tapping technique—chiefly different freshening cycles, depth of face, thickness of freshening—are described. The experiment is to last 4 years.

491. ĆURČIĆ, M. Neka zapažanja kod smolarenja crnog bora. **[Some observations on the tapping of *Pinus nigra*.]** *Šumarstvo* 7 (2), 1954 (93–107). [Serb.serb.f.g.]

Following 5 years of trials with French and German faces on various species in Serbia, experiments were set up in 1952 to compare the yield and general efficiency of these 2 methods with a Jugoslav method (on *Pinus nigra*) using a broader, German-type face that started higher (3 to 3·5 m. from ground level) and freshening every 3, 4, 5 and 8 days with a specially made tool having a 10-cm. cutting edge. Results are tabulated for each month of an April-Sept. tapping season, indicating a greater seasonal yield for the Jugoslav method for every freshening cycle. Some notes are given on chemical stimulation trials—spraying with 25% HCl with or without $CaCl_2$, the combined chemicals showing sufficient promise, with an 8-day freshening cycle, to justify the extension of such trials to all tapping districts. Tables are also given showing output data per tapper and per tapping gang.

492. Azinheira, A. Algumas nocões sobre a anatomia e fisiologia do sistema resinífero do lenho do pinheiro bravo. **[Anatomy and physiology of the resin-producing system of *Pinus pinaster*.]** *Estud. Inform. Serv. flor. aqüic. Portugal* No. 32–*C*3, 1954. pp. 18 + 1 plate. 15 refs. [Port.port.] Limited distribution.

The facts are reviewed and their bearing upon resin-tapping methods discussed.

493. Schopmeyer, C. S., Mergen, F., and Evans, T. C. **Applicability of Poiseuille's law to exudation of oleoresin from wounds on Slash Pine.** *Plant Physiol.* 29 (1), 1954 (82–7). O.R.E.

The variables in a modification of the equation for Poiseuille's law for flow of liquids through capillaries were measured in the resin-duct system of 12 trees of *Pinus elliottii* var. *elliottii*. Regression analysis showed that the product of 3 of the independent variables, viz. the reciprocal of the viscosity of oleoresin, the number and the size of resin ducts, accounted for 83% of the variation in flow rate between trees. These 3 factors therefore may be useful criteria for selection of parent trees in tree breeding for high oleoresin yields. *From authors' summary.*

494. David, R., and Dagan, C. Oléorésinogenèse et gemmage. **[The formation of oleoresin and tapping.]** [*Pap.*] *8th int. bot. Congr. Paris, Sect. 11* 1954 (57–60). [F.] X.

A comparative study was made of the glucoside content of needles in Maritime Pine carrying (1) ordinary French faces, (2) bark-freshened faces with acid stimulation. The content of soluble glucosides was greater for (2).

495. Hepting, G. H. **Gum flow and pitch-soak in Virginia Pine following *Fusarium* inoculation.** *Sta. Pap. Stheast. For. Exp. Sta.* No. 40, 1954. pp. 9. 8 refs.

Spore suspensions of *Fusarium lateritium* f. *pini* applied to the streaks, stimulated the flow of resin from a single freshening throughout the whole season, and considerable gum-soaking took place behind the face, but yields both from tapping and wood for distillation were too low to be commercially attractive. The use of the fungus does not appear to have spread the disease in the area. [Cf. *For. Abstr.* 10 (No. 1353).]

496. Clapper, R. B. **Stimulation of Pine oleoresin flow by fungus inoculation.** *Econ. Bot.* 8 (3), 1954 (269–84). 8 refs.

A water suspension of spores of *Fusarium lateritium* f. *pini* inoculated into virgin streaks prolonged the substantial flow of resin from Longleaf Pine to 3 weeks and from Slash Pine to 5 weeks as against 1 week for untreated streaks. Refreshening and re-inoculation prolonged the flow from Longleaf to 2 and from Slash Pine to 3 weeks. No typical cankers developed on the trunks. Yields from inoculated faces usually equalled those from faces treated with H_2SO_4 for 4–6 weeks and then declined, so that the season's yields seldom equalled those from acid stimulation. Depth of resinosis behind inoculated faces extended usually ½ in., sometimes 1½ in. Greater depths occurred when the trees were wounded with downward hatchet strokes and the wound inoculated. Investigations are continuing. *From author's summary.*

287. *Bamboo and Cane Growing etc.*

See Nos. 147, 369.

289.4. *Shade Trees for Crops*

497. Robertson, J. K. ***Acacia* spp. as shade trees for Coffee.** *E. Afr. agric. J.* 19 (4), 1954 (272).

Albizzia maranguensis is usually considered the best, with *Cordia holstii*, a good second-best, coffee shade-tree in the Northern Province, Tanganyika. *Grevillea robusta* is better for windbreaks. Acacias have hitherto not received mention. On the foot-slopes of Meru Mt., with 51 in. of rain, *Acacia sieberiana* is very promising and *A. spirocarpa* is accompanied in the Southern Highlands by consistently good growth and cropping of coffee. There with 50–60 in. of rain *A. albida* is also successfully used.

3. WORK SCIENCE (WORK STUDIES). HARVESTING OF WOOD: LOGGING AND TRANSPORT. FOREST ENGINEERING

30. WORK SCIENCE (WORK STUDIES): GENERAL

498. GLÄSER, H. **Bibliography on work science in forests. Vols. 1 and 2.** FAO/EFC Pilot Committee on Logging Techniques, Geneva. No. *MEFAO*/3/54, 1954. pp. 477. [E.F.]

A comprehensive bibliography, arranged according to the Oxford System of Decimal Classification for Forestry with domestic subdivisions.

499. MATTSSON MÅRN, L. **The fundamental background of the Swedish job study technique in forestry according to the SDA [Föreningen Skogsarbetens och Kungl. Domänstyrelsens Arbetsstudieavdelning, SDA, Stockholm].** [*Pre-issue*] *Proc. Congr. int. Union For. Res. Organ., Rome 1953* Section 32 (No. 2/6), 1953. pp. 5. 12 refs. [E.] Limited distribution.

500. MATTSSON MÅRN, L. **Schematic synopsis of the most essential time groups in job studies concerning forestry.** [*Pre-issue*] *Proc. Congr. int. Union For. Res. Organ., Rome 1953* Section 32 (No. 2/8), 1953. pp. 6. 6 refs. [E.] Limited distribution.

501. MATTSSON MÅRN, L. **Some basic definitions regarding work and time moments [i.e. factors] in job study technique.** [*Pre-issue*] *Proc. Congr. int. Union For. Res. Organ., Rome 1953* Section 32 (No. 2/7), 1953. pp. 7. 8 refs. [E.] Limited distribution.

Defines 17 terms from SDA1943 as further revised by the author.

502. HILF, H. H. Begriffe, Masse und Methoden der Leistungsuntersuchungen im Hauungsbetrieb. **[Conceptions, measurements and methods of work studies in logging.]** [*Pre-issue*] *Proc. Congr. int. Union For. Res. Organ., Rome 1953* Section 32 (No. 2/4), 1953. pp. 12. 6 refs. [G.] Limited distribution.

302. *Man and Work (Physiology and Psychology)*

503. HILF, H. H., and KAMINSKY, G. Aufgaben, Methoden, Grenzen und Bedeutung arbeitsphysiologischer Untersuchungen in der Forstarbeit. **[Problems, methods, limits and importance of research on work physiology in forest work.]** [*Pre-issue*] *Proc. Congr. int. Union For. Res. Organ., Rome 1953* Section 32 (No. 1/3), 1953. pp. 8. 25 refs. [G.] Limited distribution.

504. GLÄSER, H. Beiträge zur körperlichen Beanspruchung bei der Waldarbeit, insbesondere bei Einschlagsarbeiten am Steilhang. **[Physical demands in forest work, particularly in logging on steep slopes.]** [*Pre-issue*] *Proc. Congr. int. Union For. Res. Organ., Rome 1953* Section 32 (No. 1/2), 1953. pp. 8 + 4 gphs. 10 refs. [G.] Limited distribution.

[Cf. *For. Abstr.* 15 (No. 310).] Studies on limited material showed that energy consumption in logging is high (an average of 321 ± 31 kcal./hour), considerably higher than for e.g. planting (157 ± 31 kcal.), and that although it is higher for such conditions as considerable branchiness or steepness of slope, the differences for the total operation are only slight. These results, and figures of the relative time and energy consumption for the different aspects of work involved (standing, light work, walking, heavy work, axe-felling, sawing, barking, splitting, lifting and carrying), and of the differences between different felling teams are shown in graphs.

505. KARVONEN, M. J. **Physiological research in lumberjacks' working competitions.** [*Pre-issue*] *Proc. Congr. int. Union For. Res. Organ., Rome 1953* Section 32 (No. 1/4), 1953. pp. 4. [E.] Limited distribution.

A summary of studies on body measurements, consumption and selection of food, and energy expenditure in actual work during the 1951 national finals. [Cf. *For. Abstr.* 13 (No. 857).]

304. *Hygiene. Safety. Accidents and their Prevention*

See also Nos. 530, 958.

506. ČERMÁK, K. Bezpečnost práce v lesnictví. **[Work safety in forestry.]** Práce-Vydavatelstvo Roh, Praha. 1953. pp. 82. 11 refs. [Cz.] Price *Kčs.*14·50.

The first section (injuries in forest work) deals with the human factor (age, fatigue, experience), environment, kind of work, kinds of injuries and their after-effects, and safety rules in forest work (felling, barking, primary conversion). Other sections deal with transport, seed harvesting, work in nurseries and plantations, and fire-fighting.

307. *Tools, Equipment, Machines and Working Animals: General*

See also Nos. 421, 430, 578, 605, 609–10, 669, 746.

507. ILON, B. Maskiner för skogen. **[Equipment for forestry.]** *Skogen* 41 (18), 1954 (288–9, 298). [Sw.]

A brief description of equipment (mostly Swedish), shown at the Swedish agricultural fair at Linköping. Includes cultivators, tractors, trailers, lorries, loading apparatus and horse sledges.

31. LOGGING AND TRANSPORT: GENERAL

See also No. 1295.

508. SMITH, W. T. **Preparation, extraction, conversion and marketing forest produce on private estates.** *Quart. J. For.* 48 (3), 1954 (183–90). A paper read to the British Association, 1953.

509. TACK, C. H. **[1] Logging in Switzerland. [2] Logging and sawmilling practice in the Southern United States and its application in Uganda.** *Tech.*

Note For. Dep. Uganda No. 2/53, 1953. pp. 3 + 12 + 14 dgms.

[1] Describes the working of the Wyssen cableway already in use in Nyasaland and the Sudan and of the Lasso-Cable in use near Costermansville, Belgian Congo. [2] A comprehensive account of logging and sawmilling with negro labour in the Southern States and its lessons for Uganda.

510. Repin, M. V., and Oreškin, S. I. Perevod lespromhoza na cikličnyĭ metod raboty. (Iz opyta Kresteckogo lespromhoza CNIIMÈ). [**Switching over in a lespromkhoz to a 'cyclic' method of working. (Experience in the Kresttsy lespromkhoz of the Central Research Institute for Mechanization and Power in the Forest Industry.**] *Lesn. Prom.* 13 (11), 1953 (8–14). [Russ.]

In timber extraction, the 'cycle' is understood to be the time required for carrying out all work involved in the felling, skidding, stacking or loading on log-transporting appliances, of a given quantity of timber from a felling site of a given size. The length of the cycle should be evaluated from the average output attained in the limiting ('bottleneck') operation, in this case skidding. The form of work organization in the cyclic method involves the use of a composite working gang. The work of two half-gangs (each divided into a day- and a night-shift) each working with a TL-3 winch is described in detail and the output figures are tabulated for this gang (4 cycles/24 hours). Wages are calculated individually for every worker.

511. Simmons, F. C. **Logging Beech and specifications for Beech products.** *Beech Utiliz. Ser. Ntheast. For. Exp. Sta.* No. 10, 1954. pp. 30. 4 refs.

Discusses logging methods, prevention of deterioration of logs and bolts, and specifications for different industrial assortments.

32. FELLING AND RELATED OPERATIONS

322. *Felling Season. Preparatory Measures*

512. Tonkelj, I. I. Biologičeskaja suška kak sredstvo povyšenija plovučesti listvennoĭ drevesiny. [**'Sour felling' as a measure for increasing the buoyancy of hardwoods.**] *Lesn. Prom.* 13 (4), 1953 (10–3). [Russ.]

Discusses the advisability of 'sour felling' on the basis of available data, and graphs and tabulates results of the author's observations on Birch, Aspen, Pine and Spruce. The reduction of specific gravity by sour felling is more pronounced in clear-felled than selection-felled trees: for a certain ultimate specific gravity, 10 as opposed to ca. 40 days, while ordinary seasoning in stacks (unbarked) takes ca. 200 days. Sour-felled Birch logs without end seals floated for 50 days, and only 10% had sunk after 90 days. Arrangements for mechanized logging with TL-3 winches and sour felling are illustrated and described.

513. Materna, J., and Novák, V. Arsenová intoxikace neošetřených stromů při chemickém odkorňování dřeva. [**Arsenic poisoning of untreated trees during chemical barking.**] *Lesn. Práce* 33 (6), 1954 (260–8). [Cz.]

Presents the results of tests on 2 stems and 1 stump of Spruce, all untreated, adjacent to stems or stumps treated with Na_3AsO_4. From the girdles of these latter in all 3 cases a strip of brown cambium ca. 10 cm. wide was found to extend (through the common root system) to the top of each untreated tree, and As was detected in measurable quantities in this brown cambium. Counts of barkbeetles seem to indicate reduced resistance of the unintentionally poisoned stems to insect attack. Forty more cases of indirect poisoning were recorded, without making chemical tests, the poisoned stems showing in most cases dieback of the crown.

514. Wilcox, H. **Some results from the chemical treatment of trees to facilitate bark removal.** *J. For.* 52 (7), 1954 (522–5). 2 refs.

[Cf. *For. Abstr.* 15 (Nos. 317–8, 320)]. A summary of results from extensive field trials, now nearing conclusion. The relative ease of peeling of dominants treated at mid-season with 40% Na arsenite and measured by a special instrument [cf. *For. Abstr.* 16 (No. 522)] in October/November was: Hemlock (very easy) 17, Spruce 25, Red Oak 28, Elm and Balsam Fir 32, Hard Maple 33, Aspen 35, Yellow Poplar 38, Red Maple 56, Ash 67, White Birch 90 (very hard). Better results are expected, particularly with White Birch, in the spring, but Ash remains difficult. The chemicals tested included 6 arsenical and 3 phenoxy types (2,4,-D; 2,4,5-T). The most effective, cheapest, and most easily obtainable was Na arsenite, which promotes peeling throughout the length of the tree. For use with this, 62 wetting agents and stickers were tried but none of these gave better peeling. The most effective method of application was 2–3 brushings of Na arsenite (20% in water) on a barked girdle 6 in. wide for trees of 8–10 in. and wider for larger diameters. In the testing period (1 April–1 Sept.) the best time for treatment was during the sap-peeling season (for hardwoods from mid-May to the first week of Aug.; for Spruce, a few days longer). In Spruce and Birch, natural peeling starts suddenly, this early bark slipping being attributed to hormone activity associated with the resumption of phloem growth which precedes by ca. one month the cambial divisions that materially facilitate barking. During the sap-peeling season treated trees showed extensive collapse of the cambium and new xylem cells, and partial collapse with excessive callus formation in the sieve elements in the immature phloem—changes not evident in trees treated before the start of the peeling season.

515. Sarles, R. L. **Chemical bark peeling of White Pine by applying sodium arsenite in September.** *For. Mimeo. Ohio agric. Exp. Sta.* No. 4, 1953. pp. 2 + 1 plate. 3 refs.

From a small-scale test it appears that White Pine [*Pinus strobus*] can be successfully treated by using Na arsenite as late as 24 Sept. Complete separation of the bark from the wood was obtained within 4 months of the date of treating.

516. Meek, W. L., Bergeson, E. D., and Walters, C. S. **2,4,5-T as an aid in peeling Jack Pine.** *For. Note Ill. agric. Exp. Sta.* No. 49, 1954. pp. 2.

Young trees (12 years old) of *Pinus banksiana* were readily killed by a basal spray of 2,4,5-T at a rate of 25 lb./100 gal. kerosene applied during the growing season, but were able to resist spraying in the dormant season. A marked loosening of the bark and reduced moisture content were apparent in killed trees. Spraying was expensive, but it may be possible to reduce costs below those incurred in the test.

323. *Felling and Subsequent Primary Conversion*

See Nos. 519–29, 551.

326. *Sequence of Operations (including Felling Instructions, Primary Conversion after Extraction, Composition of Gangs, One-man Work etc.)*

See No. 531.

33. DEGREE OF UTILIZATION AND WASTE. CLEARING THE FELLING SITE. HARVESTING OF SMALL WOOD

See also Nos. 531–2, 599–601, 1054, 1215.

517. FAHNESTOCK, G. R. **Roofing slash piles can save—or lose—you dollars.** *Fire Control Notes* 15 (3), 1954 (22–6).

An experiment was undertaken to obtain a reliable comparison between burning roofed and unroofed piles of slash. Roofing was with 2 × 2 ft. or 4 × 4 ft. waterproof paper [cf. *For. Abstr.* 13 (No. 1261)]. It was found that 70% more roofed piles could be burned in a given time. The factors governing the economics of the method are cost of paper and ease of firing unroofed piles, but the fire-protection aspect must also be considered.

518. **Methods of land-clearance for agriculture.** *Nature, Lond.* 174 (4419), 1954 (68–9).

Summarizes papers read at a meeting arranged by the Society of Chemical Industry to discuss large-scale clearing of forest: 'A review of methods of land clearing' (*A. H. Bunting, et. al.*), and 'The present rôle of arboricides in bush and forest clearance' (*J. D. Fryer*) [see *For. Abstr.* 16 (No. 614)].

35. PERFORMANCE MEASUREMENTS FOR DETERMINING PIECE RATES IN FELLING AND RELATED OPERATIONS

See also Nos. 502–4.

519. HILF, H. H. **International performance comparison in the field of logging.** [*Publ.*] *FAO/EFC Pilot Comm. Logging Tech.* No. *FAO/EFC/Log/*31, 1954. pp. 31 + 11 gphs. + questionnaire.

Analyses the data derived from a questionnaire sent to member countries [cf. *For. Abstr.* 15 (No. 2564)] on performance scales and time studies. Replies were received from Austria, Finland, Germany and Switzerland. Subjects covered are thinning of small, medium and large Pine and Spruce, and the various operations involved.

520. HILSCHER, A. Notwendigkeit und Zweck einer Normalleistungstafel: ihr Zustandekommen in Österreich. **[The need for and purpose of a standard performance table: its construction in Austria.]** [*Pre-issue*] *Proc. Congr. int. Union For. Res. Organ., Rome* 1953 Section 32 (No. 2/9), 1953. pp. 20 + 2 gphs., 2 tbls. [G.e.f.] Limited distribution.

Includes some tabulated results of time studies to be used in establishing standard piece rates (with allowances for work difficulty) in Austria.

521. MAKKONEN, O. **Practical application of the results of time studies in logging.** [*Pre-issue*] *Proc. Congr. int. Union For. Res. Organ., Rome 1953* Section 32 (No. 2/3), 1953. pp. 5. [E.] Limited distribution.

Illustrates the use of factors for work difficulty (branchiness, bark thickness, stand density, stem form, defects in trees, nature of ground, depth of snow, and temperature) in determining wages.

36. TOOLS, MACHINES AND EQUIPMENT FOR FELLING AND RELATED OPERATIONS

See also Nos. 551, 956–7, 992, 1054.

522. WILCOX, H. **Bark peelability tool.** *Equipment Handbook Release, American Pulpwood Association, New York* No. 157, 1953. pp. 3.

The quantitative measurement of bark-peeling resistance is desirable for the study of the natural peeling season of pulpwood species and for evaluating the effectiveness of chemical treatment. This paper describes a tool devised at Syracuse to measure the adherence of bark to wood, and now manufactured by the Sandvik Saw & Tool Co., 47 Warren St., New York 7. [Cf. *For. Abstr.* 15 (No. 3614).]

523. GLÄSER, H. Die Messung des Schälwiderstandes beim bastfreien Entrinden von Faserholz. **[Measurement of the peeling resistance during the clean barking of pulpwood.]** *Holz-Zbl.* 80 (95), 1954 (1131–2). 5 refs. [G.]

Describes and illustrates the tool developed by H. Wilcox [cf. preceding abstract] and manufactured by Sandvikens Jernverk AB, Sandviken, Sweden. Comparative tests carried out with this tool and that developed by H. Zieger (which measures the sum of the peeling resistance and the bending resistance of the bark strip over a pulley) were much in favour of the first.

524. Foreløbige resultater for tidsstudier av Skoglunds barkemaskin. **[Preliminary results of time studies with the Skoglund barking machine.]** *Inform. Skogbr. Skogind. ForsknForen.* (*Transportutv.*) No. 7 [1953?]. pp. 4. [Nor.]

In studies made on the Skoglund machine [cf. *For. Abstr.* 13 (No. 3876)] by Föreningen Skogsarbeten och Kungl. Domänstyrelsens Arbetsstudieavdelning (SDA), Sweden, the following preliminary results were obtained: (1) effective barking time per piece increased slightly with increasing volume, but time/cu.m. decreased with increasing cu.m./piece; (2) considerable differences in barking time were found between different workers; (3) when the unbarked pieces were divided into 3 classes according to difficulty in barking, and the barked pieces into 3 classes according to completeness of barking, the best barking results were found among the pieces classed as easy to bark, and there was least damage

to the wood in this class. Results are given in tables and graphs.

525. Eisenhauer, G. Einiges über Sägebügel. **[Bows for bow saws.]** *Forst- u. Holzw.* 9*A* (14), 1954 (295–8). 2 refs. [G.]

[Cf. *For. Abstr.* 15 (No. 1412).] Further data on strain measurements, with a discussion of their significance in the design of bow saws.

526. Internationale Normung der Sägeblätter und Handsägen. **[International standards for saw blades and hand saws.]** *Int. Holzmarkt* 44 (23), 1953 (10–2). [G.]

Reports briefly on the meeting in Paris in Oct. 1953 of the I.S.O. and includes proposals for a standard for one-man cross-cut saws.

527. **Directory of mechanical saws for felling and bucking.** FAO, Rome. No. *FAO*/52/6/3090, 1951. pp. 82. 110 refs. Price $1·00.

Contains: (1) alphabetical list of manufacturers; (2) technical specifications of various models; (3) bibliography of tests, output, and characteristics of power saws; and (4) translation into French and Spanish of terms used in this directory.

528. Die neue Graf-Einmann-Krafthandsäge. **[The new Graf one-man power saw.]** *Int. Holzmarkt* 45 (4), 1954 (12). [G.]

Describes with illustrations and technical specifications a new saw cutting diameters up to 50 cm., and weighing only 20 kg.

529. Arend, J. L., Smith, R. N., and Ralston, R. A. **Tests of a portable wood chipper.** *Sta. Pap. Lake St. For. Exp. Sta.* No. 30, 1954. pp. 37. 8 refs.

A series of tests was made using Oak, Aspen and Pine wood to determine production rates, operational costs, and general suitability of the chipper for slash and brush disposal. The chipper was found to be well balanced and highly mobile. A 2-man crew proved the most efficient. Production rates with an 8-knife model ranged from 77 cu. ft./hour for Oak branches less than 1 in. in diam. to 241 cu. ft. for Aspen 4–6 in. in diam., production rates quickly increasing with diameter. Rates with a 12-knife model ranged from 128 cu. ft. for Oak 4–6 in. in diam. to 286 cu. ft. for small Oak brush; here rates generally decreased with increasing diameter. The 12-knife chipper was underpowered for continuous chipping of 4- to 6-in. material. Costs of operation and maintenance averaged $1·53/hour. Data on chip weight, volume, size, and yield in relation to wood volume are included and the possible use of the chips for pulping is discussed.

530. Miles, E. E., and Hoekstra, P. E. **Tree climbing safety hint.** *J. For.* 52 (7), 1954 (526–7).

Describes and illustrates a safety device for use with the 'Swedish ladder', to prevent slipping of the chains that fasten the successive sections of the ladder to the tree.

37. TRANSPORT

531. Koroleff, A. **Full-tree logging—a challenge to research (a problem appreciation and compilation).** *Woodl. Res. Index Pulp Pap. Res. Inst. Can.* No. 93 (*B*–1), 1954. pp. 101. 78 refs. Price $3·50.

Discusses experience (mainly from Russia and the U.S.A.) on full-tree logging [skidding and hauling the whole tree] in its relation to felling, skidding, conversion at landings, silviculture and forest protection, and forest products, and contains a section with additional data on full-tree logging in France, Italy, W. Germany, U.S.A., Russia and other countries. Concludes that research is needed on the value of the method for Canada. The following papers are included in appendices: The nutrient cycle in forest stands (*H. J. Lutz*; pp. 73–6); Notes on some silvicultural aspects of full-tree logging (*D. R. M. Scott*; pp. 76–83; 27 refs.); Effects on soil fertility of slash removal from the cutover (*H. D. Long*; pp. 83–4); Notes on silvicultural aspects of full-tree logging (*L. Holt*; pp. 84–8); Quality of producer gas from various tree materials (*G. M. Horner*; pp. 88–91); Experience in logging-waste utilization (*N. M. Birukov*; pp. 91–3); Status and prospects of charcoal production in eastern Canada (*J. Risi*; pp. 93–5; 1 ref.); and Comparative characteristics of short-wood, tree-length and full-tree logging methods (*B. J. McColl* and *W. A. E. Pepler*; pp. 95–6).

532. Shaw, R. G. **Forestry practice in Britain: the extraction of softwood thinnings.** *Wood* 19 (8), 1954 (329–31).

Equipment and methods.

371. *Loading and Unloading*

See also Nos. 507, 555–6.

533. Snabbare omlastning. **[Quicker loading.]** *Skogen* 41 (18), 1954 (290). [Sw.]

Describes briefly apparatus to be used by the Swedish State railways. The apparatus, which is on wheels and easily moved, is hooked to the rails on the opposite side of the railway wagon to the lorry to be unloaded, and winches the bundled load (up to 16–17 cu.m.) on to the wagon. A bundle of 6–8 tons can be loaded in 3 mins.

534. Lasting av virke på jernbanevogner med tømmerhest. **[Loading wood on railway wagons with a timber hoist.]** *Inform. Skogbr. Skogind. ForsknForen.* (*Transportutv.*) No. 19, 1953. pp. 2. [Nor.]

Results of a small-scale time study on the time per wagon and per cu.m. are tabulated.

535. Tømmerlasteapparat for jernbanevogn. **[Timber-loading unit for railway wagons.]** *Inform. Skogbr. Skogind. ForsknForen.* (*Transportutv.*) No. 31, 1954. pp. 3. [Nor.e.]

The unit consists of a steel frame 4 m. long with an adjustable pyramidal upright frame, 2·3 m. high at each end. Two wires pass from a double-drum winch (driven by electricity or diesel) one each over a pulley block at the top of each upright. The unit, which is mounted on wheels, is placed alongside the railway wagon, anchored to the nearest rail and steadied against the base of the wagon. The wires are run out by hand (up to a distance of 55 m.) and fastened to a suitable load (about 1·5 cu.m.). This is winched across the ground and up sleepers on to the wagon. A daily average of 120 cu.m. was loaded by 3 men. The unit is made by Isachsen's Mek. Verksted, Larvik.

536. Babickiĭ, G. M. Razrabotka lesosek bez verhnih skladov pri pogruzke hlystov kranom 'Culesovec-III'. **[Extraction without log dumps [by skidding with KT-12 tractors and] loading [for rail transport] with the 'Culesovec-III' crane.]** *Lesn. Prom.* 13 (9), 1953 (4–9 + 2 photos). [Russ.russ.]

The new crane 'Culesovec-III', which is mounted on the KT-12 tractor, has a hoisting capacity of 3000 kg., a hoisting height of 6·5 m., and a winch tractive effort of 3500 kg. Performance during May–June, 1953, in one of the Lenles lespromkhozes is described in detail, the new method dispensing with log dumps and reducing the skidding distance.

372/377. *Land Transport*

See also Nos. 507–10, 531–2, 536, 566.

537. Pancer, A. V. Novye trelevočnye lebedki L-19 i L-20. **[The new L-19 and L-20 skidding winches.]** *Lesn. Prom.* 13 (6), 1954 (4–12). [Russ.]

Illustrated description of two new winches. The L-19 operates with an endless cable, has a maximum skidding distance of 500–600 m., a tractive force (first gear) of 6000 kg., a working-cable speed (first gear) of 43·5 cm./sec., and weighs 8500 kg.; it is driven by a 4-cylinder, compressionless D-54 diesel engine of 54 h.p. The L-20 winch, in which the working cable is attached to the drum, is driven by the same engine and has a tractive force (first gear) of 6000 kg. decreasing to 3000 kg. as the cable is wound on the drum, corresponding cable speeds of 38 and 82 cm./sec., and total weight 6400 kg.

538. Smerdov, V. Bezmačtovaja trelevka lebedkami TL-3. **[Ground skidding with TL-3 winches.]** *Lesn. Prom.* 13 (1), 1953 (10–1). [Russ.]

Describes a case of sparless skidding, using two TL-3 winches for a felling site 500 m. square. The tree-length logs (Spruce/Beech/Aspen stand, mean stem volume 0·22–0·30 cu.m.) were skidded in bundles (ca. 3·5 cu.m. each), their thin ends being drawn into a conically-tapered iron cylinder ca. 54 cm. in diameter, running free on the lead-line above its several choker lines. The maximum skidding distance is 350 m.

539. Oreškin, S. I. Trelevka lesa lebedkoĭ s nepreryvnym dviženiem trosa. **[Winch skidding with an endless cable.]** *Lesn. Prom.* 13 (5), 1953 (4–13). [Russ.]

A new series of tests [cf. *For. Abstr.* 14 (No. 3432)] with monocable skidding, carried out in 1952 at the Kresttsy lespromkhoz, employed both the TLBT winch (used in the 1951 tests) and a new L-15 winch; the latter proved more efficient and of stronger construction. Since 1953, new tests have been made with the prototype of the L-19 winch. Mounted on a base frame together with a D-54 motor, it comprises a two-speed reducing gear and a pulley with 40 chuck-jaws, and has 4 auxiliary drums, of which two (the working and haulback) are used for handling logs, a third for loading and the fourth for constructional assembly. The motor was also used for driving an A.C. generator which supplied the current for electric saws and lighting. The pull was 6000 (4000) kg. in the 1st (2nd) gear, the rate of travel 43·5 (62·5) cm./sec., and skidding distance 500–700 m.

540. Walleczek, F. Ein neuer österreichischer Kabelkran für Holzbringung. **[A new Austrian cableway for wood extraction.]** *Int. Holzmarkt* 45 (7), 1954 (5–7). [G.]

Describes with illustrations a type of bi-cable in which the log, held in position by chain loops from each end of the metal carrier, is carried horizontally instead of vertically.

541. Die Holzbringung am Seil 'wirtschaftlich' gesehen. **[Cable transport of timber as an economic proposition.]** *Int. Holzmarkt* 45 (1), 1954 (26–7). [G.]

A short notice of the 'Arlberg' cableway, resembling a skyline crane, and manufactured by Maschinenbaufirma E. Nesler, Bludenz, Vorarlberg, Austria. It is cheap and simple to run. There are 3 sizes.

542. Utforming av hesteredskap. 1. Drag. **[The design of equipment for use with horses. 1. Shafts.]** *Inform. Skogbr. Skogind. ForsknForen.* (*Transportutv.*) No. 12, [1953?]. pp. 2. [Nor.]

Illustrates designs of sledge shafts ensuring sufficient play for the natural movement of the horse's shoulders.

543. Hesteslådd. **[Horse sledge.]** *Inform. Skogbr. Skogind. ForsknForen.* (*Transportutv.*) No. 4, [1952?]. pp. 4. [Nor.]

Gives photographs and scale drawings for a sledge designed by the Norske Skogforsøksvesen.

544. Traktorslådd. **[A tractor sledge.]** *Inform. Skogbr. Skogind. ForsknForen.* (*Transportutv.*) No. 8, [1953?]. pp. 2. [Nor.] (Supersedes *Inform. Skogbr. Skogind. ForsknForen.* (*Transportutv.*) No. 5).

Gives scale drawings for a sledge designed by the Norske Skogforsøksvesen.

545. Traktordoninger. **[Tractor sledges.]** *Inform. Skogbr. Skogind. ForsknForen.* (*Transportutv.*) No. 22, 1953. pp. 4. [Nor.]

Discusses briefly, with illustrations, the three common arrangements: (1) where the load rests on the two sledges only, (2) where it rests on both sledges and the rear of the tractor and (3) where there is only one sledge and a semi-trailer attachment to the tractor. Also discusses the use in favourable conditions of a train of sledges. Various types of brake are described. Norwegian firms supplying (1), (2) and (3) are listed.

546. Mégille, X. de. L'arche de débardage. **[The logging arch.]** *Bois For. Trop.* No. 36, 1954 (20–4). [F.f.e.span.]

Describes the use and advantages of the logging arch, the various types available, and the considerations to be taken into account in choosing one.

547. Mégille, X. de. **Report on forestry criteria and equipment of tractors.** [*Publ.*] *FAO/EFC Pilot Comm. Logging Tech.* No. *FAO/EFC/Log/*28, 1954. pp. 73.

Contains the following chapters: general characteristics of tractors suitable for forestry; the engine; miscellaneous; equipment; special criteria for the tracks of track-laying tractors. It is a revision of an earlier publication. [Cf. *For. Abstr.* 15 (No. 2578).]

548. **Directory of wheel and track-type tractors produced throughout the world.** FAO, Rome. No. *FAO*/52/3/1295, 1951. pp. 365. [E.F.Span.]

Gives (1) addresses of manufacturers, (2) specification of wheel tractors, (3) specifications of track-type tractors.

549. Hjultraktor. **[Wheeled tractors.]** *Inform. Skogbr. Skogind. ForsknForen.* (*Transportutv.*) No. 17, [1953?]. pp. 2. [Nor.]

Tabulates technical data on tractors from some 20 manufacturers and gives addresses of Norwegian suppliers.

550. Protection des tracteurs à chenilles employés dans l'exploitation forestière. **[The protection of crawler tractors used in logging operations.]** *Equipm. Note FAO* No. *C*.2.54, 1954. pp. 2. [F.]

Notes on protective casings for radiator, crank case, rollers, lubrication point, engine and spark arrestor, and protective cages for drivers.

551. Orlov, S. F., Krjučkov, G. Ja., Lyčev, A. P., Babickiĭ, G. M., and Fedorov, A. A. Pervyĭ opyt raboty valočno-trelevočnyh mašin. **[First results of work with combined felling and skidding machines.]** *Lesn. Prom.* 13 (11), 1953 (18–21). [Russ.]

Illustrated description of an experimental machine designed by the S. M. Kirov Academy of Forest Engineering. It is substantially the KT-12 tractor (tracks, chassis, engine and transmission). The engine, gas-producer conduits, gear-box, winch and gas-producer are all protected from falling trees by special iron framing. A choker is first passed round the tree to be felled and its middle ring connected to the hook of the operating cable; slight tension on this pulls the tree towards the machine. The tree is then felled by electric saw, and falls on the machine. A zone up to 8 m. wide can be cleared of trees by one machine. At the depot, all tree-length logs are released from the chokers. It is claimed that use of the new machine increases the output per man-shift from 3–3·5 to 5·5–6 cu.m. This latter figure is likely to be increased if the 'Culesovec' self-propelled crane is used along with the machine [cf. *For. Abstr.* 16 (No. 536)].

552. Iljn, B. A. Novaja shema organizacii traktornoï trelevki lesa k avtomobiljnym dorogam. **[A new lay-out for tractor skidding of logs to lorry roads.]** *Lesn. Prom.* 13 (7), 1953 (13–5). [Russ.]

Illustrated description of a lay-out for KT-12 tractors in combination with the Fakeev loading crane.

553. Gorbačevskiĭ, V. A. Naïvygodneïšaja reïsovaja nagruzka lesovoznogo avtomobiljnogo poezda. **[The most suitable load per trip for a timber-lorry with trailer.]** *Lesn. Prom.* 13 (8), 1953 (10–4). [Russ.russ.]

Tests with ZIS-5, ZIS-150 and ZIS-151 lorries on different roads showed that both the output per shift and output in relation to fuel consumed increase as the load per lorry is increased. The upper load limit is determined by the adhesion of the wheels to the road; hence lorries with more than one pair of driving wheels are recommended. The wear-and-tear of the engines (per ton/kilometre) decreases as the total load increases. Types of lorry and trailer suitable for different types of forest road are recommended.

378. *Water Transport*

See also Nos. 512, 1176.

554. Volodenkov, F. I. Skatka lesa v vodu traktorami KT-12 i lebedkami. **[Launching timber into water with KT-12 tractors and winches.]** *Lesn. Prom.* 13 (3), 1953 (16–9). [Russ.]

Describes and illustrates two methods of launching logs from the river bank, using either a tractor operating on the opposite, or a winch (type not specified) operating on the same bank. Special sling designs are described in detail, which open automatically or semi-automatically when all the logs pulled by the half-open sling are in the water.

555. Anlegg for overføring av tømmer fra vann til bil. **[Apparatus for loading wood from water to lorry.]** *Inform. Skogbr. Skogind. ForsknForen.* (*Transportutv.*) No. 1, [*n.d.*] pp. 3. [Nor.]

The logs are raised by a motor-powered hoist to a platform 1·40 m. above the loading platform, and are loaded from there across two U-iron frames (uprights 0·9 m. high and 2 m. apart) running on rails on the loading platform. A lorry drives in against the loading platform, its two empty frames are removed and the full frames are winched (by a motor beyond the lorry at the far side) across the platform and on to the lorry and trailer and then bolted down. The apparatus is illustrated with diagrams and photographs.

556. Anlegg for overføring av tømmer fra vann til bil. **[Apparatus for loading wood from water to lorry.]** *Inform. Skogbr. Skogind. ForsknForen.* (*Transportutv.*) No. 6 [1952?]. pp. 3. [Nor.]

Loading is done by an Isachsen winch loader mounted on a lorry and trailer. A trestle runs down from the level of the lorry platform into the water at an angle of 45°. A floating stage parallel with the lorry's length and about 6 m. from the bottom of the trestle supports one end of two gangways, 3·5 m. apart and 0·5 m. above the water, the other end resting loose on a support on the trestle. The two wires from the loader are run out and each is fastened to a hook on the outer side of the gangways so that the wires hang loosely, partly submerged. Logs are pulled in from a boom at one side of the gangways and put in position, lying across the wires, by one man on each gangway. When the load is complete the wires are fastened round the load which is then winched up the trestle to the lorry, raising the ends of the gangway resting on the trestle to pass under them. Two or three men are needed to arrange the logs for winching and the lorry driver helps with the stacking on the lorry.

The apparatus is illustrated with diagrams and photographs.

557. Čugreev, A. V. Splav lesa v plotah-sigarah na Belom more. **[Floating of timber in cigar-shaped rafts in the White Sea.]** *Lesn. Prom.* 13 (3), 1953 (24–6). [Russ.]

Illustrated description of the construction of cigar-shaped sea-going rafts 70 m. long, 12 m. wide (middle), 4 m. high, with a draught of ca. 2·7 m.

volume ca. 1300 cu.m. The raft is formed between two symmetrical frames on pontoons, each of which is provided with a log elevator driven by a winch.

558. Panov, N. N. Uglublenie perekatov splavnyh rek struenapravljajuščimi sooruženijami. **[Deepening shallows in rivers for floating by means of current-diverting installations.]** *Lesn. Prom.* 13 (3), 1953 (27–30). [Russ.]

Describes and illustrates several floating (and ice-construction, for the winter season) installations which serve to deepen shallows by inducing surface currents directed from the banks to the dynamic axis of the river and river-bed currents with an opposite direction. The fundamental parameters for determining the elements of such installations are given.

559. Andreev, P. I. Setčatye zapani na gornyh rekah. **[Terminal booms of cellular construction on mountain streams.]** *Lesn. Prom.* 13 (8), 1953 (23–6). [Russ.russ.]

Illustrated description of cellular, cribwork booms used on the major mountain streams of the Northern Caucasus, with recommendations from experience.

560. Markov, S. G. Opyt èksploatacii setčatyh zapaneĭ. **[Experience gained in the use of cellular terminal booms.]** *Lesn. Prom.* 11 (12), 1951 (13–5). [Russ.]

To prevent logs slipping under the boom and damage to the boom under the impact of logs, new booms have been developed, consisting of 2 layers of logs, the upper of which rest on floats while the lower are suspended from the upper by means of flexible cables 1·8–2·8 m. long.

561. Bakonina, N. A., and Dobrov, B. P. Svaĭnyĭ filjtrujuščiĭ volnolom. **[A cribwork wave-breaker.]** *Lesn. Prom.* 13 (4), 1953 (17–9). [Russ.]

Illustrated description of a prototype wavebreaker to be used in shallow water (depth not exceeding 3 m.) at floating depots. It consists of a beam cribwork filled with Spruce branches. A half-size model of the wavebreaker was tested with success. A mathematical calculation of the parameters of the wavebreaker is given.

562. Varypaev, E. P., and Sobolev, V. N. Samohodnaja plovučaja lebedka. **[Self-propelled water-borne winch.]** *Lesn. Prom.* 13 (4), 1953 (19–20). [Russ.]

The TL-3 winch is mounted on a paddle-propelled platform, 14 × 3·1 × 0·9 m., with a draught of 0·25 m., made of 3-mm. steel. The GAZ-MK-40 engine drives the winch and the paddles.

563. Osipov, M. E. Novye jakori dlja lesosplava. **[New anchors for timber floating.]** *Lesn. Prom.* 13 (1), 1953 (22–3). [Russ.]

Illustrated description of a new (improved Matrosov design) anchor, 400 kg. in weight, which has been found to withstand a tractive force of up to 5700 kg.

564. Rull till snøpakking av velteplasser. **[Roller for snow packing at log dumps [on the ice].]** *Inform. Skogbr. Skogind. ForsknForen.* (*Transportutv.*) No. 28, 1954. pp. 2. [Nor.]

Gives diagrams illustrating the construction of the roller, used successfully for 25 years on Rotnasjøen. Weighing 250–300 kg., it can be drawn by 2 horses, a tractor or a lorry. The log dump should be sited far out on the ice. Snow packing should begin as soon as snow falls after the ice will bear and should be repeated after each snowfall. The ice under the log dump generally holds for about 14 days after the rest melts, giving a longer drying period for the timber, and reducing sinking losses.

38. FOREST ENGINEERING

382. *Buildings. Logging Camps etc.*

565. Winkler, O. Az erdögazdaságok munkásszállásainak kérdéséröl. **[Quarters for forest workers.]** *Erdö* 2 (2), 1953 (161–70, 203–4). [Hu.g.]

Presents and discusses 2 types of plan for forest workers' hostels, and plans of 3 hostels erected in Hungary during the past year.

566. Naĭdo, A. Perenosnyĭ garaž-profilaktorii dlja traktorov KT-12. **[A portable garage for KT-12 tractors.]** *Lesn. Prom.* 13 (2), 1953 (18–9). [Russ.]

Illustrated description of a portable garage (600 × 338 × 270 cm.) made from 20 plywood panels. Besides the KT-12 tractor, it accommodates a stove and a working bench, and has electric lighting from a portable electric station. Time of dismantling—5 hours.

383. *Roads and Bridges*

567. Lajonquière, H. de, and Canal, J. Les routes forestières de la Cerdagne française. **[Forest roads of French Cerdagne [in the Eastern Pyrenees].]** *Rev. for. franç.* 6 (7), 1954 (429–43 + 1 map + 6 photos). [F.]

An account of the existing and projected system, and the engineering aspect of the roads at present under construction, with an appendix on the influence of several new roads on the costs of extraction.

568. Roger, G. Réalisation d'une route en sol stabilisé—route forestière de La Table. **[Construction of a stabilized-earth road—the La Table [Chambéry] forest road.]** *Rev. for. franç.* 6 (8/9), 1954 (531–48). [F.]

Gives particulars of soils, methods and equipment, and costs.

569. Jakovlev, G. S. Uproščennye ležnevye dorogi dlja letneĭ vyvozki lesa avtomobiljami. **[Simplified log roads for summer timber transport by lorry.]** *Lesn. Prom.* 13 (6), 1954 (12–4). [Russ.]

Describes and illustrates log roads built for the last few years at the Novaya Lyalya lespromkhoz. Sleepers 3 m. long are laid at 85-cm. spacing, and two tracks are attached to them by means of square wooden pegs. Each track consists of 4 rows of tree-length logs, 12–14 cm. in diam. at the smaller end, laid alternately top to butt end. The logs are roughly squared.

570. Lukjjančikov, C. Brevenčataja avtoležnevaja doroga. **[A twin-track log road for lorry transport.]** *Lesn. Prom.* 13 (8), 1953 (16–7). [Russ.]

Illustrated description of a log-construction twin-track lorry road, each track being made of four logs

6·5 m. long (thinner end 16–20 cm. in diam.), supported at their ends on transverse sleepers 3·25 m. long and 22–24 cm. in diam. Three subsidiary sleepers are placed between the main ones at equal intervals, without touching the track logs. The latter are somewhat smoothed on the upper surface.

571. **Portable crushing plant [for road metal].** *Equipm. Note, FAO* No. *B.*2.54, 1954. pp. 2.

572. **Allis Chalmers motor grader.** *Equipm. Note, FAO* No. *B.* 1.54, 1954. pp. 2.
Specification and photographs.

573. Stikkrenner for skogsbilveger. I. Generelle regler. II, III, IV Stikkrennematerialer. **[Culverts for forest motor roads. I: General points. II, III and IV: Materials.]** *Inform. Skogbr. Skogind. Forskn-Foren.* (*Transportutv.*) Nos. 24–27, 1954. pp. 2 each. [Nor.]
Discusses the choice of materials and the form of the culverts in wood, stone, cement or metal.

385. *Drainage, Irrigation, Sedimentation. Water Supply*

574. Boutwell, S. A. **'Dragline' forestry.** *For. Fmr.* 13 (9), 1954 (6, 15, 17–8).
Notes on experiments being made by Gair Woodlands Corp. of Savannah, Georgia, to determine the possibility, effectiveness, and cost of draining wet, unproductive areas of forest land. The dragline was handled by a fire-line plough which was also used for making shallow spur ditches draining into the main ditch made by the dragline.

575. Lindberg, K. Senaste nytt från diknings-fronten. III. **[The latest news on drainage. III.]** *Skogen* 41 (14/15), 1954 (238–40). [Sw.]

The Munksund-Lundberg plough consists of (1) the source of power, an Allis Chalmers HD 5 with a device for ripping up shrubs and tussocks and a winch with 40–50 m. of wire and (2) a plough with a coulter depth of 7 dm. hydraulically controlled and mounted between a pair of large rubber-tyred wheels. The tractor is driven 40 m. along the drainage line and clears any remaining trees, bushes and large tussocks, the wire meanwhile being run out from the winch at the back. When the tractor is stopped, the plough is attached to the wire and winched forward. It cuts one bank practically vertically, and gives a gradient of 1 : 0·4–0·5 to the other bank. If the soil is fairly heavy this gradient is satisfactory, but if it is light and crumbly further work will be needed. The rate of work in trials in Jörn forest district was 100 m./man-hour, at a cost of ca. Kr.0·50/m., plus ca. 10 öre for amortization. Cleaning during the first 2 years may amount to a further 45 öre. On suitable sites, the method may give an economic saving of 65–75% and a saving in labour of 95–98% over manual methods as compared with savings of 25–35% and 75% respectively by blasting.

386. *Waterways. Stream Training*

See also Nos. 558, 561.

576. Kirwald, E. Höckerschwellen im kombinierten Bachausbau. **[The use of large boulders in torrent training.]** *Mitt. württemb. forstl. VersAnst.* 11 (1), 1954. pp. 33. [G.g.]
Describes the use of the large boulders to be found on the banks and in the beds of mountain torrents, to make steps in the river bed and so form artificial rapids which break the force of the water. The banks so cleared can then be planted. The boulders are set in concrete beds.

4. FOREST INJURIES AND PROTECTION

577. Boyce, J. S. **Forest plantation protection against diseases and insect pests.** *FAO For. Developm. Pap.* No. 3, 1954. pp. 41. 72 refs. Price $0·50 (2*s.* 6*d.*).
In response to numerous requests, FAO is initiating a series of studies on the various phases of forest planting. Expert consultants have been engaged to prepare these studies, which will include such subjects as choice of species and sites; seed collection, treatment, and shipment; nursery, planting, and direct sowing techniques for various regions. When the series has been completed it may be possible to assemble the several studies in a revised form in a 'World Forest Planting Manual'. The present volume, the first of the series [abbreviation in *For. Abstr.*: *FAO For. Developm. Pap.*] deals with the special risks of insect attack and disease in plantations, particularly of exotic species or of species outside their usual range, and silvicultural methods of preventing and controlling them.

41. GENERAL TECHNIQUE OF FOREST PROTECTION. TYPES OF INJURY

411. *Natural and Biological Control*

See Nos. 619, 624, 676–8, 685–6, 691–4, 717–8.

414. *Chemical Control*

See also Nos. 620–1, 625, 679–83, 705, 807–8.

578. Frowein, H. J. Microsol—ein neuartiges Nebelgerät zur Schädlingsbekämpfung. **[Microsol, a new fogging apparatus for use in pest control.]** *Anz. Schädlingsk.* 27 (8), 1954 (120–4). 16 refs. [G.]
Describes the principles of the Microsol apparatus and types existing. Advantages of the Microsol are comparatively regular dispersal of the drop spectrum (which can be regulated) and a strong air current.

42. INJURIES FROM INORGANIC AGENCIES OTHER THAN FIRE

421. *Air Currents*

579. ANDERSEN, K. F. **Gales and gale damage to forests, with special reference to the effects of the storm of 31st January 1953, in the north-east of Scotland.** *Forestry* 27 (2), 1954 (97–121 + 1 plate). 57 refs.

The storm of 31 Jan. 1953 caused the windthrow of over 45 million cu. ft. in forests in the north-east of Scotland, mainly of coniferous species. Some general features of the wind climate of the country are discussed and it appears that, although gale risk is a serious factor in the region, very few gales during the last 250 years have attained a violence comparable with the recent storm. The local distribution of extreme gusts modified by topographical features is considered to be the principal cause of the varying degree of damage. There was a marked correlation between height of the trees and windthrow; few stands under 40 ft. in height have been damaged. Different species have also reacted differently, and this is discussed. Of the edaphic factors the effect of compacted soil horizons on depth of rooting has clearly been important. Finally the influence of lay-out and tending are discussed, and it is concluded that wind-resistant margins are important in the prevention of gale damage. In the less extreme cases of damage, the effect of different factors influencing gale damage accords with previous European experience which is reviewed. *From author's summary.*

580. LAITAKARI, E. Myrsyistä ja myrskyn tuhoista Suomessa vv. 1911–1950. **[Storms and storm damage in Finland during the period 1911–50.]** *Commun. Inst. for. Fenn.* 40 (30), 1952. pp. 29. 14 refs. [Fi.e.]

581. JAKOBSEN, B., and RASMUSSEN, C. Stormen den 11. Februar 1952. **[The storm of 11 Feb. 1952.]** *Dansk Skovforen. Tidsskr.* 38 (2), 1953 (193–206). 10 refs. [Dan.]

A more general account of this storm in Denmark [cf. *For. Abstr.* 15 (No. 3674)], based on replies to a questionnaire, with tables and a map showing estimated volume of damage by regions and species. The total for the country is estimated at 236,000 cu.m., of which 233,000 cu.m. was in conifers, chiefly Norway Spruce.

582. Stormen den 21. Februar 1953. **[The storm of 21 Feb. 1953.]** *Dansk Skovforen. Tidsskr.* 38 (9), 1953 (580–3). [Dan.]

On the same lines as the report on the storm of 11 Feb. 1952, but replies to the questionnaire were received in only 25% of the cases, though these cover 47% of the area in Denmark under conifers.

422. *Temperature Influences. Frost, Heat, Drought*

See also Nos. 78, 93, 160–1, 448, 592, 740.

583. KUJALA, V. Eräistä ruskettumisilmiöistä elävien puiden rungoissa. **[Brown stain occurring in living trees in south and central Finland.]** *Commun. Inst. for. Fenn.* 40 (14), 1952. pp. 24. 10 refs. [Fi.g.]

Discusses the appearance and cause of this staining, apparently due to frost, in a number of indigenous and introduced species.

584. PEDERSEN, A. **Frost damage in the Pine forest.** *Carib. For.* 14 (3/4), 1953 (93–6).

Describes damage caused to *Pinus occidentalis* in Haiti by low temperatures during the winter 1950–51. Most severely affected were seedlings and saplings up to 3 ft. high, and heaviest damage occurred in frost pockets, in the open on flat terrain, and on the savannas. In order to minimize danger from frost, clear-felled areas in even-aged stands should not exceed 1 acre. In uneven-aged stands a uniform overstorey of the older age classes should be maintained. On the savannas as little felling as possible should be done, and a heavy overstorey should be maintained on forest margins in order to give protection to seedlings invading the savanna.

585. KADAMBI, K. **Frost damage to *Pinus caribaea* Morelet, the Slash Pine, an exotic to New Forest.** *Indian For.* 80 (8), 1954 (488–92). 13 refs.

Slash Pine [*Pinus elliottii*] seedlings raised at Dehra Dun from seed imported from Maryland showed abnormal bending of the previous year's shoots during 1951 and 1953 when temperatures near freezing point occurred on 3 or more consecutive nights in the latter part of January as the leaf buds were beginning to swell. Similar temperatures in December had no ill effects.

586. TOMPA, K. Az 1952. májusi fagyok tanulságai. **[Lessons of the May frosts of 1952.]** *Erdö* 2 (2), 1953 (171–81). 16 refs. [Hu.]

The author describes from personal observation the damage done at Borota, in the Jánoshalma region, between 19 and 22 May, when the minimum air temperature fell to — 3·6° C. (with rime) contrasted with as much as 19·6° during the day. The extensive Robinia plantations suffered most, the younger stand (up to 3 or 4 years old) being wiped out except on the tops of the higher dunes. The highest casualties occurred where the canopy had not yet closed and the floor had become grassy. Altogether some 2000 ha. of Robinia were ruined, regrowth coming only from the base even in stems of as much as 5 cm. in girth. Walnut, Ash and Maple also suffered badly. In many places first injury occurred as high as 3 m. up the stems.

There is general agreement in Hungary that broad-leaved species suffer more from late frosts than conifers. The author quotes the ratings of various Hungarian (e.g. Fekete, Galontha and Kiss) and other continental authorities, there being general agreement for Hungary that, *inter alia*, Beech, Oak spp., Spruce and Silver Fir are all susceptible, also Douglas Fir according to Haracse, while Hornbeam, *Celtis*, *Pinus sylvestris* and *P. nigra* are not.

In the light of his own observations, the author controverts the accepted view that late varieties e.g. *Quercus robur* var. *tardiflora* are less vulnerable to late frost; the contrary is rather the case and in localities liable to frosts as late as May, early varieties do better.

587. JUNACK. Tod durch Winterfröste an ein- und zweijährigen Eichen. **[Death through winter**

frosts of one- and two-year-old Oaks.] *Forst- u. Holzw.* 9*A* (14), 1954 (300–1). [G.]

In April 1954, after hard frosts in Jan./Feb., it was discovered that roots of 1- and 2-year-old *Quercus robur* and *Q. borealis* had been killed although the aerial parts of the plants appeared to be healthy. Five-year-old Oaks, 2-year-old *Tilia cordata* and 5-year-old *Fagus sylvatica* were unharmed. Damage was worst where beds had been cleaned and the soil turned over in autumn.

588. Kraevoĭ, S. Ja., and Oknina, E. Z. O morozoustoĭčivosti molodyh dubkov. [**The frost-hardiness of young Oaks.**] *Dokl. Akad. Nauk SSSR* 95 (3), 1954 (677–80). 6 refs. [Russ.] A.P.B.

The severe winter of 1950–51 killed many young Oaks in sowings in the south of Stalingrad province. A study was therefore made of the frost resistance, in the next winter, of sowings made in 1951. Results are given in tables showing survival and mortality in relation to type of protection if any (e.g. snow cover, shelter from alternate strips of agricultural crop stubble, reed etc. coverings, screens, sowing in furrows), survival in relation to seedling development (number of shoot extensions, completion of lignification and formation of terminal bud, abnormally late emergence etc.), and condition of tissues and cell contents as an index of degree of dormancy [cf. *For. Abstr.* 15 (No. 2328)], the results of the last agreeing well with those of the spring seedling counts. Stage of development proved very important, best frost resistance being shown by seedlings that had completed their growth and entered dormancy early. Efforts must therefore be directed to securing early, uniform emergence and uniform growth with early lignification and terminal-bud formation. All protection measures greatly increased survival compared with controls from which the snow was removed.

589. Day, W. R. **Drought crack of conifers.** *For. Rec. For. Comm., Lond.* No. 26, 1954. pp. 40. 16 refs.

A full report on studies of trees (mainly Norway and Sitka Spruce) affected by drought crack following the exceptional drought of 1947, and correlating the occurrence of drought crack with shallow rooting depth in otherwise good soils. A secondary cause of the injury may be the light, poor structure of the wood and the occurrence of heart rot. [Cf. *For. Abstr.* 11 (Nos. 3245, 3360); 12 (No. 3376).]

590. ***Cupressus* stem-crack.** *Rep. For. Dep. Sudan 1952/53*, 1954 (43).

Following a prolonged and severe dry season in 1952–53, cracking was observed in plantations of *Cupressus lusitanica* in the Imatong mountains. The cracks occur to a depth of 2–3 in. in the wood of the stem, usually beginning near the base; they may extend vertically to a height of 20 ft. or more. In favourable cases they close up and the wood heals, leaving a small brown scar, but sometimes healing is not complete, the cracks remain open, and decay fungus and borers find entrance. The incidence of stem-crack in the most severely affected area—a plantation 10 years old with trees 45–50 ft. high—was 27% of all stems. The fundamental cause of the injury is the effect of drought on fast-growing trees. It was found that most of the roots of *C. lusitanica* ran parallel to the surface in the top 12 in. of soil; thus, if the top layers dry out, the tree cannot obtain enough water to meet the needs of transpiration. No evidence was found that some strains are more susceptible to this injury than others, and no correlation was found between stand density and incidence of cracking. Similar stem-crack was found in some plantations of *Juniperus procera*. Remedies proposed are, by delaying thinnings, to attempt to slow down the rate of growth of the trees, and to increase the proportion of Pines planted relative to *Cupressus*.

591. Patton, R. F., and Riker, A. J. **Needle droop and needle blight of Red Pine.** *J. For.* 52 (6), 1954 (412–8). 19 refs.

From the results of thousands of inoculations and the experimental production of symptoms in pot, nursery and field culture of *Pinus resinosa*, it is concluded that *Pullularia pullulans*, though a prompt invader of dead tissue in typical lesions, is not the cause of needle droop, which is due to an internal water deficit following on rapid transpiration when soil water is deficient. This is first evidenced by a collapse of the succulent bases of the current season's needles. Needle blight, the symptoms of which are distinguished, appears to originate in the oviposition of a gall midge (*Thecodiplosis* sp.). [Cf. *For. Abstr.* 4 (p. 59); 13 (No. 507); 16 (No. 643).]

423. *Precipitations*

592. Boggess, W. R., and McMillan, F. W. **Cold weather and glaze damage to forest plantations in Southern Illinois.** *Bull. Ill. agric. Exp. Sta.* No. 574, 1954. pp. 23. 8 refs.

Both *Pinus echinata* and *P. taeda* are growing near or north of their natural range in S. Illinois, where they have been extensively planted. Observations were made on damage to plantations of these species by the extremely cold weather of 1950–51 and two glaze storms in 1950 and 1952. The winter of 1950–51 showed *P. taeda* to be more susceptible to cold than *P. echinata*, which was almost unharmed. Seed source had much influence on the degree of injury, northerly provenances suffering little. Damage to foliage occurred in severe cold in November, but damage to stem tissue apparently only after severe cold in February. *P. taeda* is also more susceptible than *P. echinata* to glaze damage, when growing in comparable conditions, probably because of its faster growth. Stand density has an important influence on the amount of damage caused by glaze storms, both over- and under-stocking being dangerous. Early thinning directed towards obtaining a stand of sturdy co-dominants is recommended. The effect, if any, of provenance on resistance to glaze damage is unknown.

593. Brinar, M. Katastrofa v idrijskih gozdovih kot vzpodbuda za razmišljanje o stojnosti bukovih sestojev. [**The catastrophic damage from ice in the forests of Idria, and the stability of Beech stands.**] *Gozd. Vestn.* 12 (5), 1954 (129–46). 16 refs. [Sloven.sloven.g.]

Ca. 42,000 cu.m. of Beech was uprooted or broken between 18 and 21 Dec., 1953, at an alt. of 500–900 m., mainly on N and NE aspects, the damage representing 10–80% of the growing stock on an area of ca. 600 ha. Stands with higher stocking showed greater damage, and older age classes suffered more than younger ones. One factor increasing the possibility of damage of this kind was thinning from below; another was the transition from mixed Beech/Fir to pure Beech stands. The relationship of crown excentricity to the slope, as measured on plots, bears out the tremendous importance of the former in the stability of Beech stands. Other contributing factors are also discussed, viz. the height of the centre of gravity of the stem and the angle between the branches and the stem.

424. *Soil Conditions. Erosion Effects. Nutrient Deficiencies etc.*

594. Brett, I. **Observations on the damage caused by sea water to plantations in Norfolk and Suffolk.** *Quart. J. For.* 48 (3), 1954 (217–8).

Observations were made on several plantations flooded in Jan. 1953. *Populus serotina*, 28 years old, at first flushed in the normal way, but most of the trees failed to form full canopy, and they began to die as the weather became warmer, until by July all trees that had been flooded were dead; in September trees on the fringes of the flooded land began to die. A small plot of 10-year-old Norway Spruce on a slight rise which was flooded for 8–10 hours at most, at first appeared to be unaffected, but began to turn brown in August and by October was dying fast. At Dunwich, where flooding lasted for ca. 36 hours, Corsican and Scots Pine began to turn brown in May and were all dying when they were felled in August; surrounding Pines, flooded for a few hours only, began to die in October. *Populus serotina* (22 years old) flushed but formed only ca. 40% of the usual canopy; most of them survived until leaf-fall, but their fate is probably still in the balance. Oaks (*Q. robur* and *Q. cerris*) growing among the Pine were not visibly affected. The younger Oaks, planted in 1948, and known to have been standing in salt water for two days, are still healthy. The older Oaks (planted 1932), which had been flooded once before by sea water in 1947, are still flourishing. At Holkham, where a large area of sand dunes was planted with Corsican and Scots Pine ca. 60 years ago, nearly all the flooded trees died. Many of the Corsican Pines were 9–14 in. d.b.h. and when observed in July 1953 it was seen that many were split longitudinally and exuding resin.

In general there was no sign of dying off in conifers until the commencement of warm weather in May, or in hardwoods until they had formed 40–60% of full leaf, which implies a correlation with rate of transpiration. The possibility is suggested that trees growing in soil that has been only once flooded for a short time, having a fairly low saline content, may gradually build up a toxic concentration of salt in their tissues as transpiration proceeds throughout the summer. This would explain the delayed dying off of trees on the edge of flooded areas, which is still proceeding.

The following list of shrubs and trees in order of decreasing sensitivity to salt water is based on observations made in the summer of 1953: Ash, Poplar, Alder, Sycamore Maple, Beech, Rhododendron, Scots and Corsican Pine (probably most conifers), Lime, Gorse, Willows, Holm Oak, Thorns, Brambles, Birch, Sallows [*Salix* section *Capreae*], English Oak, and Turkey Oak. [Cf. *For. Abstr.* 15 (No. 3682).]

595. Traaen, A. E. **Injury to Norway Spruce caused by calcium chloride used against dust on roads.** *Proc. 7th int. bot. Congr., Stockholm 1950*, 1953 (185–6). [E.]

Injury was apparently caused both by $CaCl_2$ dust from the treated road blowing on to the foliage of the trees, and from assimilation of the $CaCl_2$ by their roots.

596. Björkman, E. **The 'yellow tip disease' of Spruce (*Picea abies* Karst) plants in forest nurseries.** [*Pap.*] *8th int. bot. Congr. Paris, Sect. 13* 1954 (119–20). X.

The yellow discoloration at the top of Spruce plants, and, in severe cases, their brown discoloration and death, which has appeared in central and southern Sweden, particularly in nurseries on arable land with high pH values, is probably due to an unfavourable nutritional balance in the soil. Analyses suggest that it is the K/Ca balance which is at fault. Mild cases have been arrested by a very slight reduction in the pH level. In more severe cases good results have been obtained with K_2SO_4. Other factors, however, in addition to the K/Ca balance, may play an important part in causation.

425. *Chemical Influences (Atmospheric)*

597. Santos, N. Ferreira dos. Acção dos gases sulfurosos como agentes de doenças abióticas em povoamentos florestais. [**Sulphurous gases as a cause of disease in forest stands.**] *Estud. Inform. Serv. flor. aqüic. Portugal* No. 33–F3, 1954. pp. 22 + 1 plate. 10 refs. [Port.e.] Limited distribution.

Leaves of *Eucalyptus globulus* and of *Pinus pinaster* gathered near an industrial centre showed large lesions, which could not be attributed to any fungus infection. Analysis of the leaves showed that the damage was produced by sulphurous gases discharged from a mine.

598. **Condition of White Pine [*Pinus strobus*] in the Sudbury district.** *Rep. For. Insect. Dis. Surv. Can. 1953*, 1954 (81–2).

A study of the effects of SO_2 in the atmosphere. In areas near the source of the fumes there was an increase in the number of trees showing foliage injuries, which corresponded with the increase in age of the foliage (6·1% for current year, 7·9% and 32·3% for 1-year foliage in June and Aug. respectively, and 48·7% for 2-year-old foliage). There was a steady decline in increment on plots near the source of fumes and many young trees showed signs of sunscald.

43. FOREST FIRES

See also Nos. 264–6, 281.

431. *Predisposing Factors and Causes. Fire Danger. Fire Behaviour*

599. OLSON, D. S. **Preliminary tests on relative inflammability of logging slash by species in the Western White Pine type.** *Res. Note For. Exp. Sta. Idaho* No. 5, 1953. pp. 6 + 1 tbl.

Experimental tests established the following decreasing order of inflammability: (1) *Larix occidentalis*, (2) *Tsuga heterophylla*, (3) *Pseudotsuga taxifolia*, (4) *Pinus monticola*, (5) *Abies grandis*, (6) *Pinus contorta*, (7) *Thuja plicata*, (8) *Picea engelmannii*, (9) *Pinus ponderosa*. Common opinion has usually been that the order of inflammability was very different, namely (9), (8), (5), (4), (7), (2), (1), (6), (3).

600. OLSON, D. S. **Solids and voids in logging slash.** *Res. Note For. Exp. Sta. Idaho* No. 8, 1953. pp. 4.

A study was made of logging slash from 25 trees of *Pinus monticola* (ca. 80 years old, average d.b.h. 14·6 in.). Slash was measured successively, (*a*) in its natural condition, (*b*) lopped and spread, and (*c*) piled in the conventional manner, (*d*) chipped. The gross volume of (*a*) was 1050 cu. ft./tree, of (*b*) 631 cu. ft., of (*c*) 72 cu. ft., and of (*d*) 19 cu. ft., for a net solid volume of ca. 7 cu. ft. The relevance of this to fire hazard is discussed.

601. OLSON, D. S. **Slash volume in relation to species and timber volume harvested.** *Res. Note For. Exp. Sta. Idaho* No. 9, 1953. pp. 8 + 3 gphs.

Since bd. ft. measure is the common unit of measurement in U.S. forest management for planning forest operations, including cost of slash disposal, it is desirable to be able to convert slash volume into terms of log scale. This has been attempted from a study of cubic volume measurements of slash from individual trees. Slash volume varies with species in the Western White Pine type. Tolerant species, having heavier crowns, contribute more than intolerant species to limby slash. The ratio of slash volume to bd. ft. volume varies appreciably with diameter class in all species; in general, the proportion of limby slash to commercial timber volume decreases with ascending diameter class. Available data indicate that ca. 30 cords of logging slash/acre, uniformly distributed, is the borderline betwen dangerous and reasonably safe conditions for fire control on logged-over areas. *From author's summary.*

602. CROSBY, J. S. **Using a danger meter to predict fire probability.** *Fire Control Notes* 15 (3), 1954 (18–21).

A study was made of the relation between fire occurrence and fire-danger meter readings for Missouri, for Clark National Forest. It was found that the average number of fires/day varied almost directly as the daily maximum meter reading. A method of establishing such correlations for local conditions at the district level is outlined. [Cf. *For. Abstr.* 15 (No. 2603).]

603. **Hygrographs are valuable helps.** *Protect. Bull. B.C. For. Serv.* No. 2, 1954. pp. 4.

Notes on the use, care, and disadvantages of hygrographs for measuring relative humidity.

604. ARNOLD, R. K., and BUCK, C. C. **Blow-up fires—silviculture or weather problems?** *J. For.* 52 (6), 1954 (408–11).

These fires, defined as building up so violently in intensity or speed as to defy fire fighting, are analysed under ignition and burning pattern, atmospheric conditions (illustrated), topographic location and surface conditions. Conversion of closed to open forest multiplies fuel temperature by 1·5 and wind velocity by 10 + and halves fuel moisture. Silviculture affects microclimate vitally, particularly as all factors may be in critical balance, only needing deterioration in one to set the whole off.

432. *Prevention and Control*

See also Nos. 19, 517, 807–8, 1268–70, 1272, 1278, 1280, 1285–6.

605. LOGAN, W. E. M. **American forest fire control methods.** *E. Afr. agric. J.* 19 (4), 1954 (239–50). 1 ref.

Outlines methods in pre-suppression, suppression (appraisal, fire-fighting, mop-up and patrol, crews), equipment (radio units, pumps, vehicles, aircraft tools), organization and finance, with suggestions on finance and practice for Kenya conditions.

606. SUMAN, R. F. **Firebreaks that pay their way.** *For. Fmr.* 13 (9), 1954 (4–5, 14, 16).

Progress report on an experimental fireline 66 ft. wide and ca. 2 miles long, in Georgia, U.S.A., which was clear felled, disked, sown with a mixture of forage grasses and legumes, and kept close grazed in spring and summer and lightly grazed in autumn and winter. The efficacy of different forage species is discussed. The fireline effectively barred the progress of two wildfires, and the cost of establishment and maintenance was covered in the 2 years of experiment by returns from the cattle.

607. COLLIN, A. Mise en défense contre les feux de brousse et reforestation des savanes du Bas-Congo. **[Fire protection and reforestation of the savannas of the Lower Congo.]** [*Proc.*] *1st Conf. for. interafric., Abidjan 1951*, 1952 (441–58). 4 refs. [F.e.]

Government is now generally agreed that for large parts of the Belgian Congo the only practicable means of regenerating the production potential for annual crops is by means of the forest fallow. For the rapid re-establishment of this in the derived *Hymenocardia/Hyparrhenia* savanna round Thysville (Lower Congo), wild fires are the greatest impediment and early burning is too slow in effect. Here, where land is in great demand, a network of live firebreaks protected by 50-m. burned strips and located so as to use as fully as possible natural features, forest clumps and galleries etc., is being tried [cf. *For. Abstr.* 7 (No. 1186); 8 (No. 1060)]. The results of 7 years' protection on sandy, sandy-clay and clay soils is compared in association tables with the condition in unprotected savanna. It is considered that under complete protection the three

soil types will require respectively 10, 10–15 and 30 years to regain a forest cover. For live firebreaks, spot sowings in the first rains (mid-October) of *Pentaclethra macrophylla*, *Derris* sp., *Milletia versicolor*, Mangoes, *Cassia spectabilis* and *Bixa orellana* are recommended, the germination, growth and hardiness of the first 3 being best. *Harungana madagascariensis* planted as 1-year stumps showed excellent and rapid growth.

608. DEVRED, R. Une légumineuse comme essence de coupe-feu: le *Sweetia brachystachya* Bth. [***S. brachystachya* for live firebreaks.**] [*Proc.*] 1*st Conf. for. interafric., Abidjan 1951*, 1952 (481–92). 5 refs. [F.e.]

This accommodating and hardy tree, 5–8 m. high and 15–20 cm. in diam., indigenous in a coffee region of Brazil (annual rainfall 1166 mm.) is eminently suited in plasticity, form and silvicultural response to this purpose. It is free-seeding, coppices, and gives excellent fuel. Fresh seed (8000/kg.) germinates 100%, falling away to 50 at one year. It can be sown direct, 3–4 seeds per hoed patch or pregerminated (8 days) for steep slopes. These sowings require 2 weedings in the first rains. The best method of planting is with stumps from 1-year plants (0·75–1·5 m.). Seedbeds are sown at 20 × 10 cm. or ca. double that density in alluvial soil. The firebreak consists of 5 lines, 5 m. apart, with plants at 3 m. in the lines. Pits are 15–20 cm. cube. Stumps are prepared by stripping all leaves, cutting out nonlignified wood, and reducing roots, which are then puddled. A 20% replacement reserve is held for planting in the 2nd–3rd month. At least one weeding is given for the first year. For better resistance to rodent damage, root collars should be at least 1 cm. diam. A fire trace and early burning protect the firebreak periphery for the first 5–6 years, by which time all grass growth over a strip 25–30 m. wide should be suppressed. Photographs illustrate the morphology, root systems, seedlings, habit, canopy and actual resistance to wild fires. It is proposed to coppice alternate plants on a 10-year rotation, at Mvuazi, Lower Congo, where these breaks are in use to build up the natural regeneration of the forest fallow in *Hyparrhenia* savanna. [Cf. *For. Abstr.* 14 (No. 1292).]

609. DORMAN, L. A. **Use of irrigation pipe in forest fire suppression.** *Fire Control Notes* 15 (3), 1954 (9–13).

The use of light aluminium irrigation pipe (3-in. pipe in 16-ft. lengths) instead of heavy hose, was tested satisfactorily in several fires. Its advantages over hose are that it is faster to lay and pick up, easier, quicker, and cleaner to handle, requires less maintenance, can be used over longer distances, and with reasonable care will outlast hose several times over.

610. **U.S.F.S. model 52A flail type fireline trencher: operation and maintenance handbook.** Forest Service, U.S. Department of Agriculture, Washington. [1953?] pp. 28.

434. *Revegetation etc. of Burnt Areas*

See Nos. 343, 345.

435. *Benefits of Fire Control. Injurious Effects of Fire. Fire Losses*

See also Nos. 28, 343, 612, 703.

611. MITCHELL, J. A. **Mortality from fire in Jack Pine stands.** *Tech. Note Lake St. For. Exp. Sta.* No. 416, 1954. pp. 2.

Tabulated figures and a graph show % (total number of trees or b.a.) of Jack Pine stands killed by surface fires, by diameter class. Mortality decreases with increasing diameter up to 6 in. d.b.h., then levels off.

612. BARNARD, R. C. **The control of lalang (*Imperata arundinacea* var. *major*) by fire protection and planting.** *Malay. Forester* 17 (3), 1954 (152–6 + 4 photos). 2 refs.

A number of experimental plots were formed in 1949–50. Where there was a risk of fire, the plots were protected by a clean-weeded, cultivated line 6–8 ft. wide. Several species were tried, either planted in *lalang* or sown (before burning, after burning, or with no burning, of *lalang*). The results have been very variable, and the indications are as follows: (1) None of the species sown or planted, with the possible exception of *Schima noronhae*, can be regarded as directly responsible for the eradication of *lalang* in cases where it has died out. (2) Sowing in *lalang* (burnt or not) was generally a failure. (3) Where *lalang* has been eradicated after 2–3 years' fire exclusion, it has been due to: (*a*) a dense natural growth of *Melastoma malabathricum* (often mixed with coppice regrowth of *Vitex* spp.) which begins to die back after about 3 years; (*b*) the dying out of *lalang* in full light, usually in small patches and associated with *M. malabathricum*, the cause of which is unknown; (*c*) the development of a dense carpet of herbaceous creepers (mostly *Mikania scandens*) under the light shade of *Albizzia falcata* and in some cases *Gmelina arborea*, which smothers the *lalang*.

The conclusions are that quick eradication cannot be expected from planting or sowing of the species tried [listed with brief comments], and that natural succession in fire-protected *lalang* can result in the *lalang* being killed off by the development of *M. malabathricum* in patches in ca. 3 years. The most promising species for accelerating natural succession is *Albizzia falcata* planted as stumps.

436. *Beneficial Effects of Fire. Uses of Fire in Silviculture and Other Forms of Husbandry*

See Nos. 344, 347, 349, 352, 473, 482, 630.

44. DAMAGE BY HARMFUL PLANTS. VIRUS DISEASES

441. *Weeds*

See also Nos. 336, 379, 404–6, 518.

613. VINCENT, A. B. **Mountain Maple [*Acer spicatum*]. Project M-424.** *Silv. Leafl. For. Br. Can.* No. 80, 1953. pp. 3. 2 refs.

Discusses its growth characteristics, damage caused to conifer regeneration, and possible methods of control.

614. Fryer, J. D. **The present role of arboricides in bush and forest eradication.** *Chem. & Ind.* 1954 (24), (688–9). P.R.

Summary of a paper presented on 20 April, 1954, at a meeting of the Agriculture group of the Society of Chemical Industry. The following techniques are described: (1) killing individual trees or stumps by application of (*a*) As_2O_3 or NH_4 sulphamate to frill, notch or band girdles, or auger holes, (*b*) 2,4,5-T or 2,4-D esters in oil, applied as (*a*) or sprayed to give a complete cover of the basal 1–2 ft. of the trunk or of the stump; (2) killing of large trees by aerial application of the above-named esters in oil solution or emulsion; (3) killing of bush by high-volume aerial application of NH_4 sulphamate or 2,4,5-T or 2,4-D; (4) as (3), followed, if necessary, by burning; (5) killing of bush by drift spraying of 2,4,5-T or 2,4-D using power atomizer sprayers; (6) killing of bush by basal hand spraying; (7) cutting the bush by hand, or mechanically, followed by spray treatment. All these treatments either showed promise or were successfully used under certain circumstances.

615. Hammarlund, A., and Ravn, K. Bekæmpelse af uønsket træ- og buskvegetation. **[Chemical control of unwanted tree and shrub vegetation.]** *Dansk Skovforen. Tidsskr.* 38 (12), 1953 (657–64). [Dan.]

Deals with small-scale trials of Herbatox-DT 24 and Tributon (commercial mixtures of 2,4-D and 2,4,5-T esters), in some of which $NaClO_3$ and Ammate were tried in parallel, made in Denmark in 1950 against undergrowth of *Ulmus* sp. (seedling and coppice origin), *Berberis* [*vulgaris*?], *Salix* sp., and mixed woody undergrowth (chiefly *Ulmus* sp., with *Sambucus nigra*, *Prunus padus*, *Corylus avellana*, *Tilia* sp. and *Fagus sylvatica*). Applications were made as sprays or by stump painting, boring or sprinkling. Concludes that the most effective method is to cut to stump level and either sprinkle the stumps with $NaClO_3$ or Ammate, or paint them with the concentrated 2,4-D/2,4,5-T preparations. If spraying is preferred it should be done in mid-summer when the full leaf area is exposed, using 20–40 c.c. of the 2,4-D/2,4,5-T preparation per litre of water. Since 100% kill cannot be guaranteed, the area must be inspected later and re-sprayed if necessary.

616. **[Chemical control of bracken.]** *Rep. For. Comm. Vict. 1953/54*, 1954 (16).

Experiments in the use of growth substances and chemical weedkillers to control regrowth of bracken indicated that none of those tested (2,4-D, 2,4,5-T, Ammate, TCA, IPPC, and maleic hydrazide) was effective except in quantities toxic to *Eucalyptus regnans* and *Pinus radiata* planting stock.

617. Blair, B. O., and Glendening, G. E. **Intake and movement of herbicides injected into Mesquite.** *Bot. Gaz.* 115 (2), 1953 (173–9). 8 refs. O.B.D.

Presents quantitative data on the intake and movement of 6 chemicals injected into stems of *Prosopis juliflora* var. *velutina* in early morning and at mid-afternoon during 4 seasons of the year. An almost complete lack of lateral movement and a limited amount of downward movement of both organic and inorganic materials were noted. Herbicides therefore should be applied so as to encircle the stump completely and as near to the stem base as possible. Na arsenite showed a high degree of toxicity and rapid and extensive movement.

442. *Parasitic (Higher) Plants. Climbers and Epiphytes*

618. Anderson, W. R. **Control of vines in Ohio timberlands.** *For. Mimeo. Ohio agric. Exp. Sta.* No. 8, 1953. pp. 1.

On the control of climbers by basal sprays of 2,4,5-T, alone or in mixture with 2,4-D.

619. **Parasite on Jack Pine mistletoe.** *Rep. For. Insect Dis. Surv. Can. 1953*, 1954 (106).

The fungus parasite, *Wallrothiella arceuthobii*, on *Arceuthobium americanum*, is increasing in abundance in Saskatchewan. It occurs only on ♀ plants, since it attacks the seed-bearing parts of mistletoe. It was found on 78% of trees that had ♀ mistletoe plants. [Cf. *For. Abstr.* 14 (No. 3472).]

620. **Control of mistletoe.** *Aust. J. Sci.* 16 (4), 1954 (143). O.R.S.

[Cf. *For. Abstr.* 15 (No. 1487).] The C.S.I.R.O. Division of Plant Industry has used radioactive tracers to follow the movement of inorganic poisons from the point of injection in the host through the branches of the tree and into the mistletoe itself. $CuSO_4$ is the most effective of 18 inorganic poisons tested but the kill of mistletoe is incomplete and damage to the host often appreciable. Organic poisons have proved more effective, especially 2,4-D and related compounds. Indeed, 2,4-D is outstanding in that it kills or seriously injures a high proportion of the mistletoe without apparent damage to the host; however, further investigation is needed on its possible effect on growth rate. The experiments, on *Eucalyptus dives*, *E. melliodora* and *E. robertsoni*, suggest that autumn is the best time for treatment. One or 2 years may pass before the mistletoe is completely killed. The 2,4-D is applied by injecting the trunk of the host through a number of holes bored with a $\frac{3}{4}$-in. wood bit or made with a punch. The dose to be given varies with size of tree and season and probably with locality and *Eucalyptus* species, but a dosage rate proportioned to the square of the d.b.h. has proved satisfactory. For autumn application in Canberra, doses equivalent to 1·5 g. of 2,4-D for a 9-in. tree gave good control without apparent damage to the trees.

621. Kadambi, K. **On *Loranthus* control.** *Indian For.* 80 (8), 1954 (493–5). 4 refs.

Loranthus pulverulentus on *Dalbergia sissoo* has been effectively controlled by injecting small doses of $CuSO_4$ and Fernoxone into the infested trees.

Details of the method are described.

443. *Fungi and Bacteria*

See also Nos. 109–10, 112–4, 577–8.

622. **Forest botany. Session 2: attacks by fungi on forest trees.** *Proc. 7th int. bot. Congr., Stockholm 1950*, 1953 (294–300). [E. or G.]

Includes papers (with discussion) by: *L. Hutchins* on virus diseases of forest trees; *N. F. Buchwald* on *Pseudotsuga* and *Phaeocryptopus gäumannii* in Denmark; *M. K. Nobles* on identification of decay fungi in British Columbia [cf. *For. Abstr.* 12 (No. 3050)]; *H. Zycha* on bark disease of Beech [cf. *For. Abstr.* 12 (No. 3378).]

623. **Forest botany. Session 8: various papers [on tree diseases in the U.S.A.]** *Proc. 7th int. bot. Congr., Stockholm 1950*, 1953 (319–23). [E.]

Papers (with discussion) by: *D. V. Baxter* on relation of cultural practice to disease in American forest plantations; *J. S. Boyce* on development of tree diseases in the U.S. [cf. *For. Abstr.* 12 (No. 3372)]; *A. J. Riker, et al.* on selection of White Pine for resistance to blister rust.

624. Gattani, M. L. **A new approach to plant disease therapy.** [*Pap.*] *8th int. bot. Congr., Paris, Sect. 20* 1954 (172–4). X.

Infection of *Albizzia lebbek* by *Ravenelia sessilis* was successfully prevented by spraying the foliage with a culture of a bacterium inhibiting germination of the fungal spores.

625. Orłoś, H. Zwalczanie hub ná drzewach za pomocą zastrzykiwania środków grzybobójczych. **[Control of fungi on standing trees by injections of fungicides.]** *Las Polski* 27 (11), 1953 (14–7). [Pol.] From *abstr.* in *Prehl. lesn. Lit.* 5 (1), 1954 (No. 104). [Slovak.] P.R.

Describes the control of fungi on standing trees by injections of chemicals, and the apparatus used. The results [in Poland?] are said to be encouraging.

443.2. Diseases of Seed and Seedlings; Damping Off etc.

626. Vaartaja, O. **'Red-patch' disease and its control.** *Bi-m. Progr. Rep. Div. For. Biol. Dep. Agric. Can.* 10 (3), 1954 (3).

This disease of *Picea glauca* seedlings [cf. *For. Abstr.* 15 (No. 401)] of which the primary pathogen has not yet been identified, was effectively controlled by sprinkling with Semesan (hydromercuric chlorophenol) at 100 lb./acre. Other fungicides were ineffective.

627. Thomas, J. E., and Lindberg, G. D. **A needle disease of Pines caused by *Dothistroma pini*.** *Abstr.* in *Phytopathology* 44 (6), 1954 (333).

Describes the course of infection of this needle blight, which can be controlled by 3–5 applications of fungicide between May and mid-July, depending on the rainfall. Bordeaux mixture has given the best results to date.

628. Soegaard, B. **Resistance tests against infection by *Didymascella thujina* (Dur.) Maire in *Thuja plicata* Lamb.** [*Pap.*] *8th int. bot. Congr., Paris, Sect. 13* 1954 (120–22). X.

Attempts were made in 1951 and 1952 at the Royal Veterinary and Agricultural College Arboretum at Hørsholm, Denmark, to find a method of raising plants resistant to *Didymascella* (*Keithia*) *thujina*. In both tests seedlings and cuttings of *Thuja plicata* were artificially inoculated with the fungus, and in both the cuttings proved resistant and the seedlings susceptible. It seems that it is the juvenile stages that are susceptible to the disease; the cuttings, representing an adult stage, are resistant. [Cf. *For. Abstr.* 13 (No. 1320); 10 (No. 2244).]

629. Henry, B. W. **Sporulation by the brown spot fungus on Longleaf Pine needles.** *Phytopathology* 44 (7), 1954 (385–6). 9 refs.

In an attempt to determine the rôle of ascospores of *Scirrhia acicola* in the epidemiology of brown-spot disease, the frequency was investigated of ascospore occurrence on Longleaf Pine needles in nature. Ascospores were found every month from Feb. 1952 to Jan. 1953 on dead needles and necrotic distal portions of needles.

630. Bruce, D. **Mortality of Longleaf Pine seedlings after a winter fire.** *J. For.* 52 (6), 1954 (442–3).

After a moderately intense grass fire in 3-year-old *Pinus palustris*, the % mortality was graphed against seedling height for 4 degrees of defoliation by *Scirrhia acicola*. Controlled burning before many seedlings are ⅓ defoliated is recommended. The 0–6 in. class survives best even when ⅔ defoliated.

631. Levisohn, I. **Aberrant root infections of Pine and Spruce seedlings.** *New Phytol.* 53 (2), 1954 (284–90 + 5 photos). 4 refs. [Bedford College, University of London.] O.R.S.

In Pine and Spruce seedlings from established forest nurseries in Great Britain, heavy root invasions by mycelia closely related to *Rhizoctonia sterilis* are frequently encountered. In Pines they are well defined infections of the haustorial type. In Spruce they are characterized by the absence of a mantle and the presence of a very coarse intercellular net. Judging by behaviour in the nursery and by pot-culture experiments, this aberrant association adversely affects growth and health of some Pine species, e.g. Scots and Corsican Pine, and is more or less harmless in others e.g. *P. radiata*, and *P. contorta*. In Sitka Spruce reduced vigour and growth caused by the aberrant infection is not pronounced. It would appear that the predisposing cause of root invasions by *Rhizoctonia*-like mycelia, with the partial arrest of growth involved, is the absence of a mycorrhizal equipment and that the presence of an aberrant type of infection indicates soil conditions inimical to the functioning of a true mycorrhiza-former which normally exercises biological control.

632. Benben, K. Nowe choroby topoli. **[New diseases of Poplars.]** *Sylwan* 98 (2), 1954 (91–5). 7 refs. [Pol.]

Describes *Valsa pustulata* causing a dieback of *Populus generosa* in a Poplar stool-bed in Poland and *Tricholoma populinum* found on the root collar of a 3-year-old *Populus lloydii*. The latter fungus seems not to form a true mycorrhiza, specimens found on the rootlets of a number of *Populus* hybrids pointing to its being a parasite in this case.

443.3. Diseases of Older Stages

Stem, Butt and Root Rots; Root Diseases

See also Nos. 129–30, 740, 1113–5, 1119.

633. BAGCHEE, K. **New and noteworthy diseases of forest trees and decay in timber in India. (i) *Panellus rupicola* (Mass.) Singer (*Collybia rupicola* Mass.) a parasite of Deodar (*Cedrus deodara* Loudon) in the Central Himalayas; and ii) (*a*) *Polyporus palustris* Berk. and Curt. and (*b*) an unidentified Basidiomycete attacking Spruce [*Picea morinda*] timber in the Eastern Himalayas.** *Indian For.* 80 (7), 1954 (373–8 + 4 plates). 4 refs.

634. KANGAS, E. Maannousemasienen (*Polyporus annosus* Fr.) esiintymisestä tartunnasta ja uhoista Suomessa. [***Fomes annosus* in Finland: appearance, infection and damage.**] *Commun. Inst. For. Fenn.* 40 (33), 1952. pp. 34. 35 refs. [Fi.g.]

Presents and discusses the results of analyses of root systems of a number of Spruce trees infected by *F. annosus*. Tables and illustrations have German as well as Finnish legends.

635. MCNABB, H. S., JR. **Variations among isolates of *Fomes annosus* (Fr.) Cke. of different geographical and host origin.** [*Pap.*] *8th int. bot. Congr., Paris, Sect. 20* 1954 (133). X.

636. PASSARGE, H. Schädlingsbefall und Standort. [**Disease incidence and site.**] *Arch. Forstw.* 2 (2/3), 1953 (245–54). 6 refs. [G.g.]

Researches in the Magdeburg forest range reveal that the stem rot *Fomes pini* and a butt rot (probably *Sparassis crispa*) show in their incidence considerable site-conditioned differences. Both avoid conspicuously the natural sites (dry impoverished sands) of their chief host, the Pine, or occur on these only in the presence of Fe-rich loamy coarse gravel sands. The chief damage is found outside the natural Pine/mixed forest. Whereas *F. pini* here reaches its maximum incidence on fertile soils with a high water-table, the soil-inhabiting butt-rott pathogen is found only in fresh, well aerated sites with low groundwater. Since there is a strong correlation of *F. pini* attack with self-pruning and with wide annual rings in the first 20 years' growth, it could probably be avoided on moist sites (valley sands) by measures that slow down such growth. On the other hand the harmful effect of site in butt-rot incidence can only be countered by a reduction of the rotation to some 80–100 years or by a change of species. For each pathogen the % incidence in 5 sites (differentiated by site quality, soil type and forest association) is tabulated; and for *F. pini* also against average width of annual ring.

637. BAXTER, D. V. **Differential treatment in American Westcoastal forests based upon the distribution of certain fungi.** [*Pap.*] *8th int. bot. Congr., Paris, Sect. 13* 1954 (117–9). X.

Discusses the advisability of different utilization and silvicultural practices in areas where decay is caused mainly by *Fomes pini* or by *Echinodontium tinctorium*.

638. WALLIS, G. W. **Commercial thinning in Douglas Fir in relation to control of *Poria weirii* root rot.** *Bi-m. Progr. Rep. Div. For. Biol. Dep. Agric. Can.* 10 (3), 1954 (4).

The effects of thinning were studied in a 50-year-old Douglas Fir stand on Vancouver Island. Heavy losses from windthrow were recorded a year after thinning, and most of the windthrown trees had old root infections of *P. weirii*. Losses during the 2nd and 3rd years were progressively less.

639. DAVIDSON, R. W., and CAMPBELL, W. A. ***Poria cocos*, a widely distributed wood-rotting fungus.** *Mycologia* 46 (2), 1954 (234–7). 5 refs. P.R. [Cf. *For. Abstr.* 4 (p. 127); 7 (No. 406); 13 (No. 512).]

The abundance in some littleleaf areas in the U.S.A. of dead Pine trees having butt and trunk rot caused by *P. cocos* led to search for the *Poria* stage. It was found that many examples had been collected and placed in herbaria under other names; ten new hosts and locations are listed.

640. STOLINA, M. Čo je pričínou usychania dubín v L'uboreči? [**What causes the dieback of Oak stands at L'uboreč?**] *Les, Bratislava* 1 (5), 1954 (11–3). [Slovak.]

The dying back at L'uboreč (near Lučenec, Slovakia) of dozens of *Quercus sessiliflora* (*Q.s.*) and *Q. cerris* (*Q.c.*) (mostly of higher age classes, and on south aspects), both with and without shrub undergrowth, starts from the tops. The individual branches die back during the growth period and the affected stem usually develops epicormics. Some stems die back only on one side, showing a wide strip of dead cambium reaching to the roots. The cause of dieback has been identified as *Armillaria mellea*, which infected the trees following the 1947 drought. *Q.c.* is less susceptible to this fungus than *Q.s.* Out of 100 dead Oak stems (70 *Q.s.* + 30 *Q.c.*), 25 were found to contain fungal strands other than rhizomorphs, 11 had rhizomorphs, 63 had both, and 1 was without fungal growth. For 100 Oak stems (again 70 + 30) with partial dieback of the crown, the respective figures were 56, 6, 1 and 37.

Wilts, Diebacks etc.

See also No. 591.

641. **Flagging of Ponderosa Pine.** *Rep. For. Insect Dis. Surv. Can. 1953*, 1954 (154).

A condition of severe flagging of Ponderosa Pine in the Kamloops Forest District of British Columbia was apparently caused by *Cenangium ferruginosum* (*C. abietis*). This is usually reported as a dieback fungus that gains entry to the host at or near the terminal buds. In this case, however, entrance was well below the succulent terminal regions, and an insect vector is suspected.

642. MOLNAR, A. C. **A disease causing flagging on Ponderosa Pine.** *Bi-m. Progr. Rep. Div. For. Biol. Dep. Agric. Can.* 10 (3), 1954 (4).

Records the occurrence of parasitism by *Cenangium ferruginosum* on Ponderosa Pine in British Columbia.

643. MOLNAR, A. C. **A flagging disease of White Pine [*Pinus monticola*].** *Abstr. of thesis*, in *For. Chron.* 30 (2), 1954 (231–2).

Experiment and observation suggest that *Pullularia pullulans* is one of the causal agents—probably the primary agent. [Cf. *For. Abstr.* 16 (No. 591).]

644. Peace, T. R. **Experiments on spraying with DDT to prevent the feeding of *Scolytus* beetles on Elm and consequent infection with *Ceratostomella ulmi*.** *Ann. appl. Biol.* 41 (1), 1954 (155–64). 14 refs. O.R.E.

A report on experiments carried out over 3 years in Folkestone and Aldenham. The results supported American conclusions that DDT is superior for this purpose to BHC [cf. *For. Abstr.* 12 (No. 2360)]. A 1·5% solution of DDT in miscible oil gave best results. Spraying of trees 20–30 ft. high, however, cost over £1 per tree per year, which is considered prohibitive except for small trees of special amenity or sentimental value. *From author's summary.*

645. Campbell, R. N., and French, D. W. **A possible selective medium for the Oak wilt fungus.** *Plant Dis. Reptr.* 37 (7), 1953 (407). 4 refs. A.P.B.

A large number of media were tested, in order to find one on which *Endoconidiophora fagacearum* would be recognizable in a mixture of other fungi. Best for the purpose was a diamalt oxgall medium that contains 20 g. Fleischmann's Dry Dimalt Syrup, 15 g. Bacto-Oxgall (Difco) and 15 g. agar per litre water.

646. White, I. G., and Wolf, F. T. **Toxin production by the Oak wilt fungus, *Endoconidiophora fagacearum*.** *Phytopathology* 44 (6), 1954 (334).

647. Fergus, C. L. **The effect of temperature and nutrients upon spore germination in the Oak wilt fungus.** *Mycologia* 46 (4), 1954 (435–41). 6 refs. P.R.

The optimum, maximum, and minimum temperatures for the germination of ascospores and endoconidia of *Endoconidiophora fagacearum* are 21–32°, 33–36°, and below 3° C., respectively. Sucrose, glucose and yeast extract permit high percentage germination. Decoctions and infusions of living and dead Red Oak bark and wood give increased germination compared with distilled water.

648. Merek, E. L., and Fergus, C. L. **Longevity of the Oak wilt fungus in diseased trees.** *Phytopathology* 44 (6), 1954 (328).

Investigations were made on various parts of infected trees under differing conditions and the following preliminary data on the survival of the fungus were obtained: twigs (in the forest) 3 weeks; twigs (in desiccators) 11 weeks; peeled billets 1½ weeks; unpeeled billets 44 weeks; sawdust, at time of sawing only; roots of Ammate-treated stumps 44 weeks; roots of arsenite-treated stumps 22 weeks; roots of 2,4,5-T-treated stumps, 15 weeks. Unpeeled billets and logs therefore may well serve as foci of infection in the forest.

649. Bakshi, B. K. **Wilt of Shisham (*Dalbergia sissoo* Roxb.) due to *Fusarium solani* sensu Snyder and Hansen.** *Nature, Lond.* 174 (4423), 1954 (278–9). 5 refs.

Further data on the disease, with particular reference to the behaviour of the pathogen in the soil, where it can apparently subsist as a saprophyte. [Cf. *For. Abstr.* 15 (No. 3754).]

650. Bakshi, B. K., and Singh, S. **Wilt disease of Shisham (*Dalbergia sissoo* Roxb.). 1. Introduction and host-parasite relation.** *Indian For.* 80 (6), 1954 (316–22 + 4 plates). 6 refs.

The disease is described and the pathogen identified as *Fusarium solani*. The roots of wilted trees are sometimes attacked by *Polyporus gilvus* but it is concluded that this association is fortuitous.

651. Ribaldi, M. Su un deperimento di *Robinia pseudo-acacia* L. var. *umbraculifera* DC.f. *bessoniana* Corvel, dovuto a *Phomopsis oncostoma* (Thüm.) v. Höhnel. **[A dieback of *R. pseudoacacia* caused by *P. oncostoma*.]** *Ann. Sper. agr.* (*n.s.*) 8 (4), 1954 (1197–212). 30 refs. [It.it.e.] C.G.B.

A disease of *R. pseudoacacia*, characterized by wilting of foliage and necrosis of bark and cambium, occurred at Ancona in 1950. The pathogen was identified as *P. oncostoma* after a close examination of the literature on *Phomopsis*. Experimental inoculations showed that the fungus has a stronger pathogenic action on weakened than on vigorous plants.

Cankers, Stem Rusts etc.

652. Jones, D. R. **Studies on a canker disease of Cypresses in East Africa, caused by *Monochaetia unicornis* (Cooke & Ellis) Sacc. III. Resistance and susceptibility of species of *Cupressus* and allied genera.** *Ann. appl. Biol.* 41 (2), 1954 (325–35). 3 refs. O.R.E.

Inoculation experiments were made on species of *Cupressus* and allied genera grown in E. Africa. Strains A and B of *M. unicornis* produced cankers on *C. arizonica*, *C. benthami*, *C. lusitanica*, *C. macrocarpa*, *C. sempervirens*, *C. torulosa*, *Cupressocyparis leylandii*, *Chamaecyparis lawsoniana*, *Juniperus procera* and *Thuja orientalis*. Strain D was parasitic only on *J. procera*. The pathogen grew well on agar media prepared from bark and sapwood extracts of *Cupressus* spp. and *J. procera*, but only slowly on *Podocarpus gracilior* bark agar. Field tests of natural infection confirmed that *C. macrocarpa* is the most susceptible species. Plots (each of 340 trees) were inoculated with mycelium. In 4 months the most extensive cankers had developed on *C. benthami*, and this species had also the largest number of active cankers and the most rapid height growth. When examined again 4 months later *C. macrocarpa* had the most extensive cankers and 60% of them were still active as compared with 20% in *C. lusitanica* and 6% in *C. benthami*. Delayed inoculation following wounding confirmed these results and in the dry season the number of successful infections was always highest in *C. macrocarpa*. Periderm was formed in the bark and sapwood of the *Cupressus* spp. in response to wounding, the process being slower in *C. macrocarpa* and *C. torulosa* than in other species; secondary growth was most rapid in *C. macrocarpa*. It is suggested that rapid height growth coupled with rapid secondary growth in this host favour the growth of the pathogen. During the rains the fungus develops as rapidly in species having a slower secondary growth

rate, but in the ensuing dry season such infections dry out and the cankers are occluded. [Cf. *For. Abstr.* 15 (No. 418).] *From author's summary.*

653. Fuller, C. E. K., and Newhook, F. J. **A report on Cypress canker in New Zealand.** *N.Z. J. Agric.* 88 (3), 1954 (211 . . . 220). A.P.B.

Over 90% of established shelterbelts of *Chamaecyparis lawsoniana* and *Cupressus macrocarpa* in Waikato district are affected by Cypress canker (*Monochaetia unicornis*). A graph is presented showing the distribution of the disease in the Waikato and parts of the Auckland and King County districts. These are the most serious areas of infection, but the disease is also widespread in varying degrees of severity elsewhere in North Island and has also been reported from Marlborough, Canterbury and Otago in South Island. Sanitation measures must be taken primarily in the nursery, where application of fungicides, such as Bordeaux mixture, has proved helpful in control. Young hedgerow plantings should be sprayed regularly with Bordeaux mixture as long as practicable. There is no practical means of controlling the disease in established mature hedges. It is suggested that where infection is severe the susceptible species should be replaced by disease-resistant conifers, such as *Cupressus lusitanica* var. *benthami*, *C. torulosa*, *Cryptomeria japonica*, *C. japonica* var. *elegans*, *Podocarpus totara*, *Chamaecyparis pisifera* var. *plumosa* and *Thuja plicata*. Suitable broadleaved species for shelterbelts are *Quercus ilex*, *Ligustrum sinense* and some Poplars and Eucalypts.

654. Francke-Grosmann, H. *Ceratostomella procumbens* Fuck. als gelegentlicher Begleiter von *Asterolecanium*-Befall an Roteichen. **[*C. procumbens* associated with *Asterolecanium* attack on Red Oak.]** *Z. PflKrankh.* 61 (9), 1954 (444–7). 6 refs. [G.g.e.] E.M.B.

Presents a description of the fungus, which was found on *Quercus borealis* in old wounds caused by *A. variolosum*. No success was obtained with inoculations on sound Red Oaks.

655. Krstić, M. Tri godine borbe protiv endotioze u Slovenačkom Primorju. **[Three years of the Chestnut blight control in the Slovenian Littoral.]** *Šumarstvo* 6 (6), 1953 (546–54). [Serb.f.g.]

During the period mid-1950 to mid-1953, 42 foci of *Endothia parasitica* have been found in the Slovenian Littoral, totalling 344 ha. out of the total Chestnut area of 1283 ha. The following measures were applied: felling of infected trees, barking, and burning felled trees and branches. The fungus was also found on *Quercus ilex*, but this is much more resistant than Chestnut. It has been found that: (1) smooth, open wounds often do not present any danger of infection; (2) the mycelium survives for ca. 1½ years in logs left on the ground; (3) coppicing may be reduced by dusting with Na_2SiF_6, or 1-year coppice shoots can be killed with the German herbicide Tormona-80, to eliminate sources of infection; and (4) some microorganisms, e.g. *Bacillus subtilis*, an undetermined bacillus and *Penicillium* spp., are capable of inhibiting germination of pycnospores and growth of the mycelium of *E. parasitica* in culture.

656. Ardikoesoema, R. I. Tanaman *Shorea javanica* di Djawa. **[Plantations of *S. javanica* in Java.]** *Repr.* from *Rimba Indonesia* 3 (3/4), 1954 (141–51 + 4 photos). 9 refs. [Jav.e.] (*Commun. For. Res. Inst., Bogor* No. 42.)

The uses of the wood and of the dammar are discussed. *S. javanica* thrives on poor soils and on soils with poor permeability, but needs good rainfall. It has been planted successfully on 70 ha. of old pepper and coffee gardens in Sumatra and regenerated readily. Four trial plots on suitable sites at Bandjar in Java have been unsatisfactory, as the plantations were infested by *Bacterium tumefaciens*. One-year seedlings were in good condition but by the second year 61–93% were attacked. Pruning or removing the galls had no effect. The disease is not fatal, as new shoots develop below the point of infection, but these are attacked in their turn. Figures showing the average heights for the first 3 years and the relative number of plants attacked are tabulated. Photographs and the table and distribution map have English legends.

657. Boyce, J. S. **A North American species of *Cronartium* destructive to *Pinus sylvestris*.** [*Pap.*] *8th int. bot. Congr., Paris, Sect. 20* 1954 (165–6). X.

A gall rust, now known to be caused by *Cronartium harknessii* [cf. *For. Abstr.* 14 (No. 104)], has been present for over 60 years in the eastern U.S.A. and Canada, where it attacks *Pinus sylvestris* of all ages. The same fungus occurs in the western U.S.A. on *Pinus ponderosa* and other 'hard' Pines. Seedlings are usually killed speedily and saplings become malformed. Inoculation occurs directly from tree to tree during May or early June and the appearance of symptoms is often delayed, making diagnosis and control extremely difficult.

658. Slipp, A. W. **Survival probability and its application to damage survey in Western White Pine infected with blister rust.** *Res. Note For. Exp. Sta. Idaho* No. 7, 1953. pp. 13.

Evidence is given in support of the current opinion that only cankers originating within 24 in. of the trunk should be considered 'threatening' cankers. A method of evaluating net survival probability based on this criterion is developed.

659. Schmid, R. Über die histologische Spezialisierung von Blatt- und Rindenpilzen, mit besonderer Berücksichtigung ihrer Beziehungen zum Phloem. **[The histological specialization of leaf and bark fungi with special reference to their relationship with the phloem.]** *Phytopath. Z.* 21 (4), 1954 (407–32). 41 refs. [G.g.] O.R.S.

Describes, with photomicrographs and drawings, the development of the attack of various fungi in the tissues of the host. *Armillaria mellea*, studied on Spruce, attacks the bark first, growing mainly in the sieve tubes, and then the wood. *Cronartium asclepiadeum* and *C. ribicola* (on Pinus spp.) attack primarily the parenchyma and ray cells. *C.*

ribicola grows readily too in the sieve tubes, penetrating their walls. The harmful effect is specially noticeable in degeneration of the cambium. In later stages the bark tissue dies, and the hyphae in the wood spread from the rays in and between the tracheids. Hyphae of *C. asclepiadeum* remain chiefly between the tracheids. Hyphae of *Coleosporium senecionis* are confined to the assimilation tissue of Pine needles; the endodermis and the central cylinder are free of hyphae. *Melampsorella caryophyllacearum* in *Abies* and *Gymnosporangium sabinae* in *Juniperus pyramidalis* are confined mainly to bark, growing preferably in parenchyma and ray cells. The hyphae of *G. sabinae* are inter- and those of *M. caryophyllacearum* intracellular in growth. In the sieve tubes both fungi are intercellular.

Foliage Diseases

See also No. 659.

660. Boyce, J. S., Jr. **Hypoderma needle blight of Southern Pines.** *J. For.* 52 (7), 1954 (496–8). 7 refs.

Describes the symptoms, distribution and damage of *Hypoderma lethale*, an important cause of needle blight in all stages of Southern Pines, excluding Longleaf. Ascospore inoculations were made on Loblolly, Slash and Pond Pine, and the fungus was also identified on Shortleaf, Pitch, Virginia and Table Mountain Pine in the field. Its appearance in the spring distinguishes it from *Scirrhia acicola*, parasitic on Loblolly of all sizes and a major disease of Longleaf seedlings, which appears in the fall and winter. Direct control of these blights appears to be impracticable and may not be necessary.

661. Jauch, C. La 'antracnosis' de los sauces cultivados en el Delta del Paraná. **[Anthracnose of Willows cultivated in the Paraná Delta.]** *Repr.* from *Rev. Fac. Agron. Vet., B. Aires* 13 (2), 1952 (285–308). 16 refs. [Span.span.e.g.]

Investigations have shown that two distinct pathogens are responsible for this 'anthracnose', *Marssonina kriegeriana* and *M. salicicola*. The fungi are described, with the symptoms of the disease and the results of artificial inoculations. *M. kriegeriana* attacks 'hybrid' Willows (an unidentified tree, widespread in the Delta, possibly *Salix alba* var. *caerulea* × *S. humboldtiana*). *M. salicicola*, here recorded for the first time in Argentina, is parasitic on *S. alba* var. *caerulea* and *S. babylonica*. In *S. alba* var. *caerulea* both leaves and branches are attacked, and the effect is more destructive than in the other 2 species, where only the leaves suffer. It is proposed to use the name 'mancha morada de la hoja' (purple leafspot) for the disease caused by *M. kriegeriana* and to reserve the name 'anthracnose' for that caused by *M. salicicola*.

Miscellaneous

662. Ziller, W. G. **Studies of western tree rusts. 1. A new cone rust on Sitka Spruce.** *Canad. J. Bot.* 32 (3), 1954 (432–9 + 8 photos). 5 refs. O.R.S.

A new cone rust has been found damaging seed of Sitka Spruce on the Queen Charlotte Islands and a new *Chrysomyxa* has been found on *Moneses uniflora* in the same area. Field observations, controlled inoculations and similarity of markings on aeciospores and urediniospores have led to the conclusion that the cone rust is the aecial stage of an undescribed *Chrysomyxa*. The rust is described and has been named *C. monesis*. Surface sterilization of the Spruce seed before export is recommended. *From author's summary.*

444. *Virus Diseases*

See also No. 622.

663. Tinsley, T. W., and Usher, G. **A colour test for detecting swollen shoot disease in Gold Coast Cacao.** *Nature, Lond.* 174 (4419), 1954 (87). 2 refs. [West African Cacao Research Institute, Tafo, Gold Coast.]

45. DAMAGE BY ANIMALS

451. *Mammals*

See also No. 379.

664. Bennett, F. A., and Halls, L. K. **The effect of grazing on Slash Pine seedling survival.** *Res. Note Stheast. For. Exp. Sta.* No. 58, 1954. pp. 2.

Survival of seedlings after one year was not significantly different on grazed and ungrazed plots, despite locally close grass cropping. The effect of grazing on the further growth and development will be studied.

665. Petrov, V. V. Stepenj vlijanija myševidnyh gryzunov na lesovozobnoviteljnyi process pod pologom dubravy. **[Influence of rodents (mice and voles) on regeneration in the mixed Oak woods of the forest-steppe zone.]** *Dokl. Akad. Nauk SSSR* 95 (3), 1954 (665–8). 7 refs. [Russ.] A.P.B.

Gives some figures to show the extent of destruction of emergent seedlings and older regeneration in a wood in the Tellerman forest, South-eastern Voronezh.

666. Brenneman, W. S. **Tree damage by squirrels silviculturally significant?** *J. For.* 52 (8), 1954 (604).

Acer saccharum is a minor component of the mixed hardwood stands on the stabilized dunes along the eastern shores of Lake Michigan and observation shows that its scarcity is probably due to attack by squirrels on young trees. The squirrel population is largely composed of black squirrels, a melanistic form of *Sciurus carolinensis* protected by law, and a continued high population will probably mean still further reduction in Sugar Maple.

667. Cook, D. B. **Susceptibility of Larch to red squirrel damage.** *J. For.* 52 (7), 1954 (491–2). 3 refs.

In New York State, *Tamiasciurus hudsonicus loquax* damages Larch plantations of various species and all ages. It cuts off leaders, twigs and small branches in Pine, Spruce and Larch, the indigenous Tamarack being rarely attacked. Of the widely planted Japanese and European Larches, the latter is preferred, the former is practically immune (a reversal of McCulloch's experience in Michigan). Dahurian Larch (*L. dahurica*) was also practically immune. Larch of Silesian origin was less susceptible than Scottish Larch, the damage to which is sometimes enough to ruin plantations.

668. Stiell, W. M., and Farrar, J. L. **Browsing damage by deer in a Pine plantation.** *Silv. Leafl. For. Br. Can.* No. 83, 1953. pp. 4.

Browsing in the winter of 1946–7 in an 8-year-old plantation (trees 3–10 ft. high), seriously damaged leaders of Scots and Jack Pine; Red Pine was scarcely touched. In the following years, leaders which had escaped were well above the snow line and browsing on the branches served as pruning and caused no lasting damage. Deer damage during the critical period could be reduced by fencing, or smearing the leaders with a repellent, but such expense would only be justified where it is impossible to grow species not susceptible to browsing.

669. **Universal stake-driver.** *Equipm. Note FAO* No. *A*.3.54, 1954 (2).

Describes and illustrates a device which makes it possible to drive even long, thin, and crooked stakes into the ground without using steps. It consists of 3 parts: (1) a hollow, tapered, wedge-shaped steel piece, concave on one side, 19 cm. long and 8 cm. across at widest; (2) a wooden wedge 16 cm. long, and (3) a chain about 120 cm. long. The concave side of the steel piece, which is ribbed transversely, is fixed against the stake about 1 m. from the sharpened end, the chain is wound several times round the stake and knotted, and the stake is then driven in by striking the wooden wedge into the steel piece.

452. *Birds*

670. Turček, F. J. **Šťavy stromov ako potrava niektorých ptákov. [Tree sap as food for some bird species.]** *Živa* 1 (5), 1953 (197–9). [Slovak.] From *abstr.* in *Prehl. lesn. Lit.* 5 (1), 1954 (No. 123). P.R.

Explains the girdling by some birds (6 species of woodpeckers) by the sap's being an indispensable ingredient of the bird's diet. The process and results of girdling are illustrated by the author's own material gathered in 1949–52. Birds are known to girdle 26 tree species. Many non-Czechoslovakian references.

453. *Insects*

See also Nos. 577–8, 807–8.

671. Saalas, U. **Suomen metsähyönteiset sekä muut metsälle vahingolliset ja hyödylliset eläimet. [The forest insects of Finland and other animals injurious or beneficial to the forest.]** Werner Söderström Osakeyhtiö, Helsinki. 1949. pp. 720. 8 pp. of refs. [Fi.] I.I.E.

672. Hinterbuchner, Z. **Výsledky prvej inventarizácie hlavných hmyzových lesných škodcov na Slovensku v roku 1953. [Results of the first census of the main forest insect pests in Slovakia in 1953.]** *Les, Bratislava* 1 (3), 1954 (17–21). [Slovak.]

673. Koehler, W. **Warunki zdrowotności lasów Polski. [Health conditions of forests in Poland.]** *Roczn. Nauk leśn.* 4, 1954 (3–18). [Pol.russ.e.] (*Prace Inst. Bad. Leśn.* No. 105.)

Discusses the health of Polish forests in the post-war period. Stands in the western part of Poland are least resistant, those in central Poland more so, and those in eastern Poland most resistant to insect attacks. Stands in W. Poland are to a large extent artificially regenerated, even-aged, often pure; the % of such stands decreases eastwards. The author recognizes 3 regions in W. Poland: (1) the northern with *Panolis flammea* and *Lymantria monacha*, (2) the central with outbreaks of *Dendrolimus pini*, and (3) the southern with *Acantholyda nemoralis*.

674. Castelão Vaz, A. L. **Trabalhos efectuados pela secção de entomologia florestal no ano de 1953. [Work of the forest entomology section [of the Laboratorío de Biologia Florestal] in 1953.]** *Estud. Inform. Serv. flor. aqüic. Portugal* No. 31-*C*2, 1954. pp. 8 + 1 plate + 14 tbls. + 1 map. [Port.] Limited distribution.

675. **Extracts from 'Record of Investigations' Agricultural Dept. 1/4/50 to 31/3/52.** *Tech. Note For. Dep. Uganda* No. 8/54, 1954. pp. 2.

Notes on forest and timber insect pests in Uganda.

676. Krzanowski, A. **O potrzebie wprowadzenia do naszych lasów nowych gatunków nietoperzy. [The need for introducing new species of bats into Polish forests.]** *Sylwan* 98 (2), 1954 (96–9). 25 refs. [Pol.]

Recommends introducing *Lasiurus cinereus* and *Lasiurus borealis borealis*, as hardy insectivorous species not requiring shelter boxes or tree-hollows.

677. Koehler, W. **Perspektywy wykorzystania dzika w ramach metody biologicznej. [The prospects of utilizing the wild boar for biological control [of forest insect pests].]** *Roczn. Nauk leśn.* 4, 1954 (125–40). 5 refs. [Pol.pol.russ.e.] (*Prace Inst. Bad. Leśn.* No. 111.)

The pros and cons (in particular for control of *Acantholyda nemoralis*) are discussed.

678. Bergold, G. H. **Radioactive experiments with silkworms.** *Bi-m. Progr. Rep. Div. For. Biol. Dep. Agric. Can.* 10 (3), 1954 (2).

Ca. 100 *Bombyx mori* larvae were injected with polyhedral virus suspended in C^{14}-labelled alanine and glycine (ca. 10 μC/larva). Unexpectedly, the β-radiation inhibited the virus multiplication and ca. 40% of the silkworms overcame the virus infection and developed to adults. They produced eggs which still had enough radiation to be counted readily and two more generations were reared. Possible genetic effects are being studied.

679. Hornstein, I., Sullivan, W. N., Tsao, C.-H., and Yeomans, A. H. **The persistence of lindane-chlorinated terphenyl residues on outdoor foliage.** *J. econ. Ent.* 47 (2), 1954 (332–5). 5 refs.

680. Glynne Jones, G. D., and Connell, J. U. **Studies of the toxicity to worker honey-bees (*Apis mellifera* L.) of certain chemicals used in plant protection.** *Ann. appl. Biol.* 41 (2), 1954 (271–9). 14 refs. O.R.E.

Results of laboratory tests on 11 chemicals used in plant protection.

681. Lieberman, F. V., Bohart, G. E., Knowlton, G. F., and Nye, W. P. **Additional studies on the effect of field applications of insecticides on honey bees.** *J. econ. Ent.* 47 (2), 1954 (316–20). 3 refs.

Tests on an alfalfa field showed that (on the basis of 10% mortality being the limit for sanction) the

following treatments were too toxic for honey bees: early morning sprays of TEPP [tetraethyl pyrophosphate] (6 oz./acre), malathion (10 oz.), dieldrin (1 oz.), heptachlor (4 oz.), aldrin (2 oz.), chlordane (1 lb.) and endrin (4 oz.), and an early morning dust of DDT (8 oz.). Treatments considered safe were: toxaphene, morning sprays of DDT (8 oz.), and Systox [E-1059 type] (6 oz.) and an evening spray of TEPP (6 oz.).

682. Schrader, G. Chlorthion, ein neues, wenig giftiges Insektizid aus der Reihe der Thiophosphorsäureester. **[Chlorthion, a new insecticide, not very toxic [to warm-blooded animals], of the thiophosphoric-acid ester group.]** *Angew. Chem.* 66 (10), 1954 (265–7). 26 refs. [G.] D.S.I.R.

While 'E605' (Parathion, Thiophos) has, for rats, a toxic value by oral administration of 6·4 mg./kg. body weight, the toxic value of the new insecticide (chemically 3-chloro-4-nitrophenyl ester of dimethylthiophosphoric acid) is 500 mg./kg. Toxicity through skin or respiration is also small, but its insecticidal properties are good.

683. Boocock, D. **Thermal fog for the control of insect pests in forests and plantations.** *World Crops* 5 (10), 1953 (409–13). 13 refs. O.R.E.

A short review of apparatus, formulations and achievements in the U.S.A., Germany and South Africa.

684. Vité, J. P. Gedanken über die Gefährdung der europäischen Lärche durch Insekten. **[Reflexions on insect damage to *Larix decidua*.]** *Holz-Zbl.* 80 (83), 1954 (1007–8). [G.]

Discusses the vicissitudes of Larch stands in Europe during the last two centuries in connexion with site conditions, diseases, pests and other factors. The damage done (total or partial) is indicated in a table giving rough scale of attack (local or widespread), condition of the host, and the insects concerned.

Isoptera

See No. 60.

Thysanoptera

See Nos. 247–8.

Hemiptera

See also Nos. 62–3, 654, 708.

685. Karpiński, J. J. *Centrobia annae* n. sp. (Hymenoptera, Trichogrammatidae), pasożyt jaj szkodnika leśnego *Cicadetta montana* Scop. (piewik górski) z puszczy Białowieskiej. **[*Centrobia annae* sp. nov., an egg-parasite of the forest pest *Cicadetta montana* from the Białowieża forest.]** *Roczn. Nauk leśn.* 4, 1954 (61–8). [Pol.russ.e.] (*Prace Inst. Bad. Leśn.* No. 107).

Describes the new species, which resembles *Centrobia silvestrii*. The first parasites were reared from 15 eggs of the host collected in the National Park of Białowieża in 1951. There is a detailed English summary.

686. Delucchi, V. ***Pullus impexus* (Muls.) (Coleoptera, Coccinellidae), a predator of *Adelges piceae* (Ratz.) (Hemiptera, Adelgidae), with notes on its parasites.** *Bull. ent. Res.* 45 (2), 1954 (243–78 + 18 plates). 57 refs.

A profusely illustrated study of the beetle and its parasites, the preliminary work to a plan for mass-rearing and shipment to Canada. Mass rearing was begun in Germany in 1951 and in Switzerland in 1952. Notes are presented on the methods used and the shipment of the first consignments.

687. Underwood, G. R. **Damage to White Pine [*Pinus strobus*] by Pine leaf chermes [*Pineus pinifoliae*.]** *Bi-m. Progr. Rep. Div. For. Biol. Dep. Agric. Can.* 10 (3), 1954 (1).

Measurement of increment cores from 186 White Pines from 5 acres known to have been attacked since 1947, and probably since 1942, showed an average reduction in ring width of ca. 60% from 1943 to 1952. The pattern follows the biennial cycle of abundance of the insect, the decrease being confined to rings formed in the years following heavy attack.

688. Cantiani, M. Il *Prociphilus fraxini* (Hartig) sull'abete bianco in provincia di Campobasso. **[*P. fraxini* on *Abies alba* in the province of Campobasso.]** *Ital. for. mont.* 9 (3), 1954 (156–60). 3 refs. [It.it.f.]

Roots of young Firs were attacked by this aphid, whose alternate host is usually Ash. No signs of its presence were found, however, on Ash or other possible hosts in the neighbourhood.

Lepidoptera

See also No. 673.

689. Živojinović, S. Mala topolina strižibuba i topolini staklokrilci ozbiljno ugrožavaju opstanak kultura topola u Vojvodini. **[*Saperda populnea* and Sesiidae present a serious menace to the existence of Poplar stands in the Vojvodina.]** *Šumarstvo* 7 (5), 1954 (273–7). [Serb.f.g.]

Describes the outbreaks in 1953 and 1954 of *S. populnea* and *Sciapteron tabaniforme* (and other Sesiidae) in 2 places in Vojvodina (500 and 150 ha., respectively).

690. Connola, D. P., Yops, C. J., and Smith, W. E. **European Pine shoot moth control tests.** *J. econ. Ent.* 47 (2), 1954 (299–302). 5 refs.

Although favourable results were obtained against this moth (*Rhyacionia buoliana*) on *Pinus resinosa* with an aircraft spray of 4 lb. DDT in 4 gal. emulsion/acre in July 1951, there was no reduction in injury by this pest when the tests were repeated in July 1952. Unknown factors involved in the timing of the sprays are probably responsible for this discrepancy. *From authors' summary.*

691. Bird, F. T., and Whalen, M. M. **A nuclear and a cytoplasmic polyhedral virus disease of the Spruce budworm.** *Canad. J. Zool.* 32 (2), 1954 (82–6 + 6 photos). 18 refs. O.R.S.

692. Jaynes, H. A. **Parasitization of Spruce budworm larvae at different crown heights by *Apanteles* and *Glypta*.** *J. econ. Ent.* 47 (2), 1954 (355–6).

Balsam Fir was sampled late in April 1951 and again in 1952 during a moderate infestation in

Maine. Tables show % of larvae parasitized by *Apanteles fumiferanae* and *Glypta fumiferanae* at different heights from the ground. Differences at different crown levels were more pronounced for *A. fumiferanae*, which gave a greater % of parasitization at the higher crown levels.

693. Coppel, H. C., and Maw, M. G. **Studies on dipterous parasites of the Spruce budworm, *Choristoneura fumiferana* (Clem.) (Lepidoptera: Tortricidae). III *Ceromisia auricaudata* Tns. (Diptera: Tachinidae).** *Canad. J. Zool.* 32 (3), 1954 (144–56). 11 refs. O.R.S.

Discusses systematic position, distribution and hosts, describes the stages of development, and outlines life history and habits in the laboratory and in the field, and rearing methods.

694. Warren, G. L. **The Spruce needleworm, *Dioryctria reniculella* Grt., as a predator of Spruce budworm.** *Bi-m. Progr. Rep. Div. For. Biol. Dep. Agric. Can.* 10 (3), 1954 (2–3).

Describes a laboratory study, which indicated that under natural conditions, where larvae of both species compete for food and shelter since both are defoliators of new growth, predation would increase since Spruce-needleworm predation increased greatly when only old foliage was supplied. Predation of budworm pupae is much higher than that of larvae, and since the needleworm larvae pupate 7–10 days later than budworm larvae, they have an excellent opportunity for predation.

695. Batzer, H. O., Hodson, A. C., and Schneider, A. E. **Preliminary results of an inquiry into effects of defoliation of Aspen trees by the forest tent caterpillar [*Malacosoma disstria*].** *Minn. For. Note* No. 31, 1954. pp. 2.

No tree was found whose death could be attributed solely to defoliation. In general the extent of crown dieback was directly related to vigour class, but appeared to be unaffected by stand age, density or site.

696. Patočka, J. Můrky rodu *Sarrothripus*—škůdci topolů. **[Moths of the genus *Sarrothripus*—Poplar pests.]** *Zool. ent. Listy* 2 (2), 1953 (76–88 + 6 photos). 9 refs. [Cz.russ.g.] I.I.E.

Illustrated description of two new species found in two places in Czechoslovakia, viz. *Sarrothripus populana* and *S. cuneana*.

697. Jeremić, M. Povodom ovogodišnje pojave gubara u NR Srbiji. **[The occurrence of *Lymantria dispar* in Serbia in 1953.]** *Zašt. Bilja* No. 20, 1953 (86–93). [Serb.e.] I.M.I.

In May–June, 1953, a mass outbreak of *L. dispar* larvae was observed in 14 districts, and local minor occurrences were reported from 50 other districts. Ca. 30,000 ha. of forest and 3000 ha. of orchards are in danger.

698. Maksimović, M. Primena metode klopki za otkrivanje gubara u šumama. **[Use of the trap method for detecting *Lymantria dispar* in forests.]** *Šumarstvo* 7 (2), 1954 (86–92). 5 refs. [Serb.serb.g.]

Experiments in several forests of Serbia with traps containing the ♀ scent (extracted in laboratories from ♀s collected during an outbreak), have shown the feasibility of attracting ♂s, thus enabling the state of outbreak to be diagnosed and offering possibilities for preventing a mass outbreak.

Coleoptera

See also Nos. 64–5, 644, 689, 873.

699. Kamp, H. J. Der Eichenprachtkäfer und seine Bekämpfung. **[*Agrilus biguttatus* and its control.]** *Holz-Zbl.* 80 (96), 1954 (1141). 8 refs. [G.]

700. Živojinović, S. Crvena ražina buba štetočina bora. **[*Omophlus lepturoides* as a Pine pest.]** *Zašt. Bilja* No. 21, 1954 (95–6). 1 ref. [Serb.] I.M.I.

Describes a case of swarming of *O. lepturoides* in Pine (*Pinus sylvestris* and *P. nigra*) stands at Maljen in Jugoslavia at 700–1100 m. altitude. Other woody plants attacked included *Crataegus* and *Juniperus*. The first swarming was on 26 May.

701. Tiwari, S. D. N. **The sapling borer of Teak.** *Indian For.* 80 (8), 1954 (433–4).

A short note on a new cerambycid borer, found in Teak plantations in Bastar State, which has been identified as *Coelosterna* sp.

702. Dominik, J. Z obserwacji nad biologią wykarczaka *Criocephalus rusticus* L. i kłopotka *Spondylis buprestoides* L. **[Observations on the biology of *C. rusticus* and *S. buprestoides*.]** *Sylwan* 98 (2), 1954 (100–4). 4 refs. [Pol.]

Observations on *C. rusticus* were made in 1950–52 on unbarked stumps of 70-year-old healthy Pines felled in March 1950. The stumps were found to be infested by the insect in summer and autumn 1950. The wood was first penetrated in March. Larvae began boring along the growth ring, just below the wood surface. Later instars penetrated into the heartwood, undeterred by resinified portions. Tunnels in the sapwood were flat in section (e.g. 12 × 4 mm.), those in heartwood less so (diameter ratios 2/1—1·5/1). The width of the tunnel varied. Adult larvae were ca. 3·5 cm. long, the pupal chamber 4–5 × 0·75—1·6 cm. Before pupation, which lasts 14–18 days, the larvae lay inert for 60 days. The first pupae were observed in mid-May. The emerged imago rests for 5–7 days and only then leaves the wood through an oval hole (7 × 3·5 up to 10 × 5 mm.). Swarming was about late June and early July, but stragglers appeared even in early August. The life cycle of *C. rusticus* on Pine stumps was 2 years, but various factors can increase it. The author also describes *Asemum striatum* and *Spondylis buprestoides*, which emerged from the same stumps in May–July, 1952. But for the somewhat smaller tunnels, it is difficult to distinguish the frass of the former from that of *C. rusticus*. *S. buprestoides* has also a 2-year cycle on green Pine stumps. Unlike *C. rusticus* and *A. striatum*, this insect is also found in the wood of barked stumps immediately after felling. The insect and bird enemies of these 3 species are listed, and the technical damage done is described.

703. Schnaider, Z. Szkodniki drzewostanów popożarowych. **[Insect pests of fire-damaged stands.]** *Roczn. Nauk leśn.* 4, 1954 (145–62). 15 refs. [Pol.russ.e.] (*Prace Inst. Bad. Leśn.* No. 113.)

The following insects are described: *Monochamus* spp., *Criocephalus rusticus*, *Spondylis buprestoides*, *Melanophila acuminata*, Siricidae, and insects attacking agricultural crops on fire areas.

704. Havelka, J., and Niedl, J. Poznámky k bionomii tesaříka *Nothorhina punctata* F. [**Notes on the life habits of *N. punctata*.**] *Zool. ent. Listy* 2 (3), 1953 (213–9). 10 refs. [Cz.cz.russ.g.] I.I.E.

A morphological description of imagos, larvae, and pupae of this species which occurs in several places in Czechoslovakia. The larvae live in the bark of old, isolated Pine trees.

705. Schindler, U. Die Bekämpfung des grossen braunen Rüsselkäfers unter besonderer Berücksichtigung der Wirkungsdauer moderner Insektizide. [**Control of *Hylobius abietis* with special regard to the duration of effectiveness of modern insecticides.**] *Forst- u. Holzw. 9A* (12–13), 1954 (253–6; 275–7). 15 refs. [G.]

Reports laboratory and field tests to investigate the effective duration of various DDT, DDT/BHC and other preparations. The DDT preparations remain effective for long periods under normal conditions, and one application in spring should provide immunity for the whole growing season. The most successful of the preparations tested were 1% Gesarol 50 paste and 0·5% Diditan-Ultra. Cost at a rate of 200 litres/ha. is ca. 11 DM/ha. The DDT/BHC preparations have a more powerful initial effect, but are less lasting and should be reserved for the quick control of outbreaks already in progress.

706. Wallace, D. R. **The Pine root-collar weevil [*Hylobius radicis*] in Ontario.** *Bi-m. Progr. Rep. Div. For. Biol. Dep. Agric. Can.* 10 (3), 1954 (2).

Describes the first recorded outbreak of this weevil in Ontario, in *Pinus resinosa* and *P. sylvestris* plantations.

707. Györfi, J. A kendermagbogár (*Peritelus familiaris* Boh.) erdőgazdasági jelentősége. [**The significance of *Peritelus familiaris* for forestry.**] *Erdö* 2 (2), 1953 (155–60, 203). 11 refs. [Hu.g.]

A report on the recent outbreak of this beetle in the Hungarian forests, with a review (based on literature) of past damage. The development of the beetle takes only one year. The ♀ oviposits in the surface soil, and the larvae feed on plant roots. The adult beetles feed mainly on the buds of woody species, and on the foliage, bark and other parts of young plants. In Hungary the pest first came to general notice through Pine mortality in 1951. Only parathion has proved of any use in control, and this soon loses its effect. Better control is obtained by summer ploughing of the area to be afforested, thus destroying the roots of the host plants and cutting short the life cycle. *From author's summary.*

708. Kerr, T. W., Jr. **Control of Willow flea weevil, Rhododendron lace bug and red-headed Pine sawfly.** *J. econ. Ent.* 47 (2), 1954 (263–5). 9 refs.

Presents the results of work on the control of insects attacking ornamentals in Rhode Island. (1) *Rhynchaenus rufipes* on *Salix pentandra*: Four sprays, each containing 1 lb. of either DDT or methoxychlor as 50% wettable powder in 100 gal. water applied, 5, 20, 39 and 53 days after adult emergence, gave almost complete control. (2) *Stephanitis rhododendri* on Rhododendron: One early June spray of 50% DDT, 50% methoxychlor or 25% lindane proved equally effective. Minimum amount of all 3 insecticides was 1 lb./100 gal. water. (3) *Neodiprion lecontei* on *Pinus sylvestris*: DDT (50%), methoxychlor (50%) or malathion (25%) were all effective. When applied to 3rd-, 4th- and 5th-instar larvae in early July, 1 lb. of insecticide in 100 gal. water was sufficient.

709. Mikloš, I. Jasenova pipa [***Stereonychus fraxini.***] *Šum. List* 78 (1), 1954 (11–21). 10 refs. [Croat.g.]

This insect, which has been causing noticeable damage in Ash stands (reducing increment) in Croatia for the last few years, swarms early in spring, and starts attacking buds and leaves. Egg-laying lasts for 2 months. The main damage is done by the larvae, whose development period is 15–20 days; the pupal stage lasts 8–10 days and the imago lives 10–11 months. Pupation takes place in the litter or on a leaf. The imago emerges early in April, but as early as the end of July it begins hibernation in moss on trees.

710. **[Scolytid-beetle attack on seedlings.]** *Rep. For. Dep. Fiji 1953*, 1954 (5).

A scolytid beetle was found attacking young plants of *Cedrela* spp. and *Swietenia macrophylla* in the nursery by boring into the stem a little above the collar and laying eggs in a chamber extending up the stem for ca. 1 inch. The outbreak was controlled by uprooting and burning affected plants and spraying the beds with BHC.

711. Nelson, A. L. **Control and salvage policy: Spruce beetle control in Colorado.** *J. For.* 52 (7), 1954 (503–5).

The 1939–52 epidemic of *Dendroctonus engelmannii* is the greatest single barkbeetle outbreak recorded in the U.S.A. Dead timber is estimated at 4000 million bd. ft. of Engelmann Spruce and 500 million of Lodgepole Pine. For the 1949–52 campaign $3,327,946 was spent, 1,219,344 trees were treated ($C_2H_4Br_2$ and water emulsion, 1 : 4) and several thousand trap trees felled. In 1952 the beetle population was greatly reduced by the severe winter, by woodpeckers and parasites and by control measures, and the major threat to the remaining stand of Spruce (12,500 million bd. ft.) was averted. The dead Spruce is unfit for sawtimber after 2–3 years (radial checking) but will stand available for pulp for quite 20–30 years. Only 100 million bd. ft. has so far been salvaged.

712. Vaux, H. J. **Some indications of the Spruce beetle control and salvage programs in Colorado.** *J. For.* 52 (7), 1954 (506–10). 15 refs.

Discusses the cost of a control programme in relation to the value of the timber at stake, and concludes that the two are roughly equal under present conditions. An improvement in the competitive position of Colorado forests in U.S. markets

would alter the relation. The amenity and conservation aspects of forest protection should turn the balance in favour of insect control.

713. CLEMENTS, V. A. **Possible means of reducing mountain Pine beetle attacks in young Sugar Pine.** *For. Res. Note Calif. For. Range Exp. Sta.* No. 89, 1953. pp. 5. 2 refs.

A study on 70 plots in the Sierra National Forest showed greatest losses where stocking, as reflected by the stand density index, was high and in the presence of understorey (suppressed and intermediate) Pines. The practical implications are that resistance to attack could be increased by reducing stand density or removing the smaller, more susceptible trees.

714. SCHNAIDER, Z. Spostrzeżenia nad zimowaniem skrycika szarego (*Crypturgus cinereus* Hrbst.). **[Observations on the hibernation of *C. cinereus*.]** *Roczn. Nauk leśn.* 4, 1954 (171–6). [Pol.russ.e.] (*Prace Inst. Bad. Leśn.* No. 116).

C. cinereus was found to hibernate not only under the bark, but also, in great numbers, in forest litter.

715. KARPIŃSKI, J. J. Nowy w faunie leśnej polski gatunek kornika z rodzaju skrycik *Crypturgus subcribrosus* Egg. (Coleoptera Scolytidae). **[A barkbeetle, *C. subcribrosus*, hitherto unknown in the Polish forest fauna.]** *Roczn. Nauk leśn.* 4, 1954 (141–4). [Pol.russ.e.] (*Prace Inst. Bad. Leśn.* No. 112.)

The insect was discovered for the first time in 1949 on *Picea abies* in two forests in Poland.

716. KOEHLER, W. Kornik sześciozębny jako szkodnik pierwotny. **[*Ips sexdentatus* as a primary pest.]** *Roczn. Nauk leśn.* 4, 1954 (177–9). [Pol.] (*Prace Inst. Bad. Leśn.* No. 117.)

Describes a case of a mass attack of *I. sexdentatus*, from broods in an adjacent mill yard, on a Pine pole stand.

717. JAMNICKY, J. Ešte o prirodzených nepriatel'och kôrovca *Ips typographus* L. **[Further notes on natural enemies of *I. typographus*.]** *Les, Bratislava* 1 (2), 1954 (14–7). [Slovak.]

Describes *Rhopalophorus clavicornis* and *Bracon stabilis*, and discusses the role played by woodpeckers (*Dryobates major, D. medius*, and *Dryocopus martius*). [Cf. *For. Abstr.* 15 (No. 1598).]

718. BOUČEK, Z., PŮLPÁN, J., and ŠEDIVÝ, J. Poznámky o blanokřídlých cizopasnících kůrovce smrkového, *Ips typographus* L. v ČSR. **[Remarks on hymenopterous parasites of *I. typographus* in Czechoslovakia.]** *Zool. ent. Listy* 2 (3), 1953 (145–58). [Cz.cz.russ.g.] I.I.E.

An identification key, and illustrated description of: *Coeloides bostrichorum, Bracon stabilis, Dendrosoter middendorfii, Doryctes mutillator, Spathius brevicaudis, Cosmophorus klugii, Rhopalophorus clavicornis, Ichneutes reunitor, Eurytoma morio, E. flavovaria, E. arctica, Pachyceras xylophagorum, Rhopalicus tutela, Dinofiscus capitatus, Tomicobia seitneri, Amblymerus typographi, Cheiropachus colon*, and *Heydenia pretiosa*.

719. SIERPIŃSKI, Z. Stan badań nad chemiczną walką z kornikiem drukarzem w lesie. **[Status of investigations on the chemical control of *Ips typographus* in forests.]** *Sylwan* 98 (2), 1954 (85–90). 3 refs. [Pol.]

A general survey of results. It was found in Poland that the method of two successive sprayings on logs in mills, suggested by Hufnagel, does not result in a 100% kill. Advocates, for control in the forest, the combined mechanical/chemical method (trap-trees, trap-logs, elimination of attacked stems, and use of insecticides).

720. LOZOVOĬ, D. I. O raĭonah poselenija boljšogo sosnovogo luboeda v uslovijah Zakavkazjja. **[The portions of the stem colonized by *Myelophilus piniperda* in the conditions of Transcaucasia.]** *Dokl. Akad. Nauk SSSR* 94 (6), 1954 (1175–6). 5 refs. [Russ.] A.P.B.

The height up the stem of attack by *M. piniperda* appears to vary directly with moisture of the site; in the *Pinetum siccum* of Armenia it is usually limited to the root-collar region, but extends in the *P. herbosum* 2–3 m. up the stem. In Georgia, attacks extend even farther upwards, and on the Black Sea coast of Abkhasia the whole stem and even branches are colonized.

721. RUMMUKAINEN, U. Koivun mantokuoriaisen *Scolytus ratzeburgi* Jans. luontumuksesta. **[On the inclination [selectivity of attack] of Birch sapwood borer *Scolytus ratzeburgi*.]** *Commun. Inst. for. Fenn.* 40 (8), 1952. pp. 14. 8 refs. [Fi.e.]

A survey of badly damaged Birch stands showed that this insect attacked almost exclusively fallen trees (91·8% of the inspected trees), and preferred rough- to smooth-barked stems, which probably accounts for the relatively greater susceptibility of *Betula verrucosa* than *B. pubescens*.

722. ZÁRUBA, C. Předpověď škod působených ponravami v lesních školkách a obrana proti nim. **[Forecasting damage by cockchafer grubs in nurseries, and their control.]** *Lesn. Práce* 33 (3), 1954 (109–14). [Cz.]

Recommends counting in September the number of grubs found in 1-m.-square plots down to a depth of 30 cm. In nurseries previously attacked the number of such plots should be 100–300/ha., in others 20–30/ha. The species, development stage, and number of grubs should be determined. In order to forecast the probable damage it is necessary to know the critical number of grubs, i.e. the number that would cause all plants to perish. Several methods of chemical and biological control are described.

723. SCHNAIDER, Z., and KARLIKOWSKI, T. Z badań nad chemicznym zwalczaniem pędraków. **[Investigations on the chemical control of cockchafer grubs.]** *Roczn. Nauk leśn.* 4, 1954 (89–107). 35 refs. [Pol.pol.russ.e.] (*Prace Inst. Bad. Leśn.* No. 109.)

Results of the following treatments are presented: (1) soaking roots of *Pinus sylvestris* plants in a paste containing water, humus, and BHC; (2) mixing BHC-Verindal in the soil of planting holes (1·8 g./hole); (3) mixing BHC-Verindal and superphosphate in the soil (1·8 g. each/hole); (4) dusting new furrows with BHC-Verindal and covering with soil, and (5) spraying plants with Intox 8 chlordane emulsion after

planting. To protect *Populus robusta* plants (6), the soil was mixed to a depth of 30 cm. with BHC-Verindal at a rate of 200 kg./ha. It was found that (1) greatly reduced mortality from chafers but in some cases it can become toxic to the plants; (2) and (3) are also favourable; (4) was ineffective; (5) is highly effective, but the large quantities of water used may restrict its application; (6) gives good results, and even seems to stimulate growth of the Poplar.

724. SCHWERDTFEGER, F. Über die Wirkungsdauer von Hexamitteln bei der Engerlingsbekämpfung. **[The duration of effect of BHC preparations in cockchafer-grub control.]** *Repr.* from *Z. Pfl-Krankh.* 61 (1), 1954 (9–17). 13 refs. [G.]

Soil in the laboratory or in the field treated with BHC preparations showed decreasing toxicity to larvae with increasing time from the date of application but was still more toxic than untreated soil 41 months after treatment; the larger the original dose the longer the duration of toxicity.

725. SKUHRAVÝ, V., NOVÁK, K., HRDÝ, I., and HURKA, K. Boj proti chroustům (*Melolontha melolontha* L.) leteckým poprašováním hexachlorcyklohexanem v roce 1952. **[Control of *M. melolontha* imagos by dusting with BHC from aircraft in 1952.]** *Zool. ent. Listy* 2 (2), 1953 (111–9). 10 refs. [Cz.cz.russ.g.] I.I.E.

The insecticide used was in powder form and contained 12% of BHC. The mortality was 90, 93 and 95% after 1, 2 and 3 days, respectively. [Cf. *For. Abstr.* 14 (No. 2495).]

Hymenoptera

See also Nos. 66, 673, 677, 703, 708.

726. KOEHLER, W. O dwoch formach gatunku osnuja gwiaździsta (*Acantholyda nemoralis* Thoms.). **[Two forms of *A. nemoralis*.]** *Roczn. Nauk leśn.* 4, 1954 (69–88). 20 refs. [Pol.russ.e.] (*Prace Inst. Bad. Leśn.* No. 108.)

Several morphological and life-cycle differences between *A. nemoralis* at Zielona Gora and in Upper Silesia point to the existence of 2 forms of this insect. The author tentatively calls the latter form *A. nemoralis* Thoms., *orientalis* W.K.; it swarms 5–7 weeks earlier.

727. ELENS, A. A. Étude écologique des lophyres en Campine (Belgique). III. Développement du 'stade cocon' et adaptation à la température des lophyres *Diprion pini* L., *D. pallidum* Kl. et *D. sertifer* Geoffr. (Hymenoptera symphita). **[Ecological study of sawflies in the Campine (Belgium). III. Development of the 'cocoon stage' and adaptation to temperature of *D. pini, D. pallidum* and *D. sertifer*.]** *Repr.* from *Agricultura, Louvain* (*Ser. 2*) 1, 1953 (77–91). 7 refs. [F.f.flem.e.g.] (*Opera Collecta Cent. Bosbiol. Limburgse Kempen* Vol. 1, 1953.)

[Cf. *For. Abstr.* 15 (No. 1606).] Comparisons were made of the relationship between temperature and duration of the cocoon stage in these 3 species, by keeping cocoons at different temperatures. Important differences were manifested by the 3 species, and comparisons with data from literature indicate probable intraspecific differences in races of *D. pini*. In contrast to previous observations on the incubation of eggs, the northern species does not differ from the southern by a greater rapidity of the process studied, but rather by the lower value of its temperature coefficient. *From author's summary.*

728. ELENS, A. A. Étude écologique des lophyres en Campine (Belgique). IV. Développement larvaire et adaptation à la température chez *Diprion pini* L., *D. pallidum* Kl. et *D. sertifer* Geoffr. (Hymenoptera symphita). **[Ecological study of sawflies in the Campine (Belgium). IV. Larval development and adaptation to temperature in *D. pini, D. pallidum* and *D. sertifer*.]** *Repr.* from *Agricultura, Louvain* (*Ser. 2*) 1, 1953 (93–100). 5 refs. [F.f.flem.e.g.] (*Opera Collecta Cent. Bosbiol. Limburgse Kempen* Vol. 1, 1953.)

The duration of larval development of these 3 species was studied at 3 different temperatures. Rate of development was highest in *D. sertifer* (the most northerly species) at all temperatures. At 18° C. it was the same in *D. pallidum* and *D. pini* but, since the temperature coefficient is higher for the latter, development rate of *D. pini* is lower than that of *D. pallidum* at low temperatures and higher at high temperatures. On the basis of the data collected the geographical distribution and seasonal cycle of these species in the Campine are discussed. *From author's summary.*

729. MILEVIĆ, M., and SPASOVIĆ, D. Suzbijanje obične borove zolje na Maljenu 1953 godine. **[Control of *Diprion pini* on Mt. Maljen, 1953.]** *Šumarstvo* 7 (4), 1954 (206–15). [Serb.serb.f.g.]

After the first mass outbreak of the pest on the forests of Mt. Maljen in 1951, another outbreak occurred in 1953 when two generations developed in the year. *Pinus nigra* was mainly attacked. To control the second generation in 1953, an area of 812 ha. was sprayed with a solution of 1·5–2·5 kg. of 33% DDT solution in 100 litres water (i.e. ca. 0·5–0·8% DDT). The spraying was done with portable sprayers, at ca. 100 litres of solution per ha. Since the maximum height attainable with these sprayers is 10 m., spraying from aircraft was also done on 350 ha. Although this measure was applied rather late in the year, the results obtained were satisfactory using 3 litres of 33% DDT emulsion per ha.

Diptera

See also No. 591.

730. REEKS, W. A. **Damage to Red Pine by a midge.** *Bi-m. Progr. Rep. Div. For. Biol. Dep. Agric. Can.* 10 (3), 1954 (1–2).

A *Pinus resinosa* plantation in New Brunswick has been attacked by a midge, believed to be a *Contarinia* sp. A fungus, *Pullularia* sp. has also been cultured from injured shoots and needles and some relation may exist between the insect and the fungus. Some of the injury is caused by the larva of the midge, which feeds between the needles within the sheath.

731. SNYDER, T. E. **Borer lines. Damage to wood by fly maggots.** *Pest Control* 22 (5), 1954 (40–2). D.S.I.R.

Describes the damage done to the wood of living Birch trees by the larvae of *Agromyza pruinosa.*

Dipterous larvae (*Chironomidae, Chironomus* sp.?) were found under a mud layer, on a piece of Willow wood with etching due to animal life. Other examples are psocids and caddis flies.

46. DAMAGE TO TREE GROWTH BY MAN

See also No. 595.

732. WADE, I. W. **Sounding damage on thin-barked trees.** *For. Mimeo. Ohio agric. Exp. Sta.* No. 12, 1953. pp. 1 + plate. 3 refs.

Describes and illustrates scars occurring on thin-barked trees, notably Beech, as a result of blows with an axe-head made in the course of sounding trees for possible internal decay.

48. INJURIES DUE TO UNKNOWN OR COMPLEX CAUSES

See also Nos. 80, 596.

733. WARING, H. D. **Unexplained death of Spruce in U.K.** *Aust. For.* 17 (2), 1953 (49–54). 8 refs.

Nine sites have been examined on which Norway and Sitka Spruce, 20–40 years old are dying. The symptoms are discussed and comparisons made with the deaths of *Pinus* species which have been studied in Australia in recent years. It is suggested that the primary cause of mortality in both countries might lie in an upset of the balance between soil moisture and aeration and be accentuated by a restriction of the growing space for roots. *From author's summary.*

734. WHITE, P. R., and MILLINGTON, W. F. **The structure and development of a woody tumour affecting *Picea glauca*.** *Amer. J. Bot.* 41 (4), 1954 (353–61). 15 refs. O.B.D.

The tumours studied are initiated in the vascular cambium during the first year's growth of stem, root or twig. They develop by radial, tangential or vertical division of a single affected cell or small group of cells. No evidence was found of a visible lesion or of any biological agent associated with these growths but all past experience tends to suggest that such agents are involved. *From authors' summary.*

735. ROTH, E. R. **Spread and intensification of the littleleaf disease of Pine.** *J. For.* 52 (8), 1954 (592–6). 9 refs.

A report on studies, from 1940 to 1951, on the spread and intensification (31 plots of 0·4 acres each) of the disease, which is now widespread in a crescent-shaped area stretching from central Virginia to N.E. Mississippi. It varies in severity from season to season, but stems seldom improve and mortality, increasing with severity of attack, causes Shortleaf Pine to yield its dominance to other Pines and to hardwoods. In the large areas studied (illustrated by air-photo-based maps) the increase in area subject to the disease is from 4 in 1942 to 18% in 1951. The littleleaf belt as a whole is not in general increasing its area (as known in 1942) but attack is becoming more serious within it.

736. COPELAND, O. L., JR. **Estimating the littleleaf hazard in South Carolina Piedmont Shortleaf Pine stands based on site index.** *Res. Note Stheast. For. Exp. Sta.* No. 57, 1954. pp. 1.

A table is given showing the expected incidence of littleleaf in relation to site index.

737. **White Pine needle blight.** *Rep. For. Insect Dis. Surv. Can. 1953*, 1954 (80).

Further evidence is now available to indicate that needle blight may be capable of causing the death of *Pinus strobus* that have been blighted annually over a period of years. Preliminary studies indicate that it may cause considerable loss of increment. Needle blight is still classed as a physiogenic disease, but the factors involved are unknown. [Cf. *For. Abstr.* 6 (p. 188).]

738. POMERLEAU, R. Le dépérissement des essences feuillues dans l'est du Canada. **[The dieback of deciduous species in eastern Canada.]** [*Pap.*] *8th int. bot. Congr., Paris, Sect. 20* 1954 (168–70). [F.] X.

Notes on dieback of Birch and other deciduous species in eastern Canada and the adjacent parts of the U.S.A.

739. **Deterioration of Birch.** *Rep. For. Insect Dis. Surv. Can. 1953*, 1954 (81).

A study of the roots of 38 Yellow Birch (10 healthy, 16 in early stages, and 12 in the advanced stages of deterioration) showed that % root mortality for the three groups averaged respectively 8·5, 14·2, and 21·8. [Cf. *For. Abstr.* 15 (No. 1624).]

740. REDMOND, D. R. **Increased soil temperatures cause rootlet mortality in Yellow Birch.** *Bi-m. Progr. Rep. Div. For. Biol. Dep. Agric. Can.* 10 (3), 1954 (1).

To test the hypothesis that Birch dieback is primarily due to increased soil temperature causing death of feeding rootlets, a small area supporting a 55-year-old stand of healthy Yellow Birch was selected and the soil was heated with a greenhouse soil-heating electric cable threaded through the feeding rootlets at about 2½ in. below the soil surface. Heat was applied from 3 June to 6 Sept. 1953, and increases in soil temperature in the treated areas were determined from measurements made with a potentiometer connected to Cu-constantan thermocouples embedded in the soil. Soil m.c. was measured by means of Colman soil-moisture units.

It was determined that under normal conditions mortality in feeding rootlets of Yellow Birch was ca. 6 or 7%. Increasing the soil temperature by 1° and 2° C. resulted in mortalities of 19 and 59% respectively, and a 5° increase resulted in 97% mortality at the end of the season. A few Sugar Maple roots inhabiting the area and normally having ca. 1% of their rootlets dead, showed no increased mortality until the soil temperature was increased by 4° or more. M.c. of the heated soil did not drop a statistically significant amount until about the 6th day after rain had replenished the supply to field capacity, and at no time did it approach the wilting coefficient. It would appear, therefore, that this increased mortality of Yellow Birch rootlets was caused by increased soil temperature and not by drying of the soil.

Laboratory experiments with some of the fungi

occurring more commonly in association with Yellow Birch rootlets have shown that those forming mycorrhizae are reduced markedly in growth rate by temperature increases above 20°, while at least one other, which is antagonistic towards these and non-mycorrhizal, is greatly favoured in its growth rate by these higher temperatures. This fungus inhabits recently dead rootlets. Thus reduction in frequency of mycorrhizae could very well have resulted from antagonism between mycorrhizal and soil fungi, the former being suppressed in their development by the increased temperature as well as by the occurrence of greater amounts of fungi limiting their growth. Nova Scotia has recently experienced a rise in summer mean daily temperature of 1·0° and New Brunswick a rise of 1·3° C.

The results of soil heating show that small increases in soil temperature when extended over a full summer can cause excessive mortality of Yellow Birch rootlets, and that a warmer climate could account for the rootlet mortality existing when dieback was worst. The relative degrees of susceptibility of Yellow Birch and Sugar Maple explain why Birch has been so badly damaged in many areas, whereas Maple has remained healthy or shown only slight deterioration.

741. Toole, E. R. **Sweetgum blight—a problem in forest management.** *Sth. Lumberm.* 189 (2362), 1954 (35).

The Delta Research Centre of the Southern Forest Experiment Station has begun investigations at Stoneville, Miss., on the prevalence and causes of blight of *Liquidambar styraciflua*, a disease characterized by a gradual dieback of the tree, often from the top down. Some data are presented on progress of the disease from 1952 to Sept. 1953 in plots at Stoneville.

5. FOREST MENSURATION. INCREMENT; DEVELOPMENT AND STRUCTURE OF STANDS. SURVEYING AND MAPPING

52. MEASUREMENTS OF STEM DIMENSIONS AND VOLUME OF TREES, STANDS, FORESTS AND TIMBER

742. Macdonald, K. R. **Yield data for Akure forest.** *Inform. Bull. For. Dep. Nigeria* No. 20, 1954 (1–6).

In a heavy exploitation of 750 acres of *Triplochiton scleroxylon*/*Cistanthera papaverifera* forest involving 40 species, the two named, together with *Entandrophragma* spp. (mainly *E. utile*), *Sterculia rhinopetala*, *Terminalia superba*, and *Mansonia altissima* contributed (in that order) 80% of the yield. Total volumes and money yield per acre are given for 3 compartments and 17 sub-compartments; also the contributions of 13 species by volume and number of trees felled in 3 subcompartments.

743. Benassi, L. Ricerche dendrometriche sulla *Pseudotsuga douglasii* a Vallombrosa. **[Mensurational studies of *P. taxifolia* at Vallombrosa.]** *Ital. for. mont.* 9 (3), 1954 (153–5). [It.it.f.]

The subjects studied (results given in graphs) were: variation of volume as a function of d.b.h.; the relation between total height and d.b.h.; bark volume; and the relation between mid-diameter and d.b.h.

521. *Diameter (Girth) and Sectional Area*

744. Quigley, K. L. **Estimating volume [of hardwoods] from stump measurements.** *Tech. Pap. Cent. St. For. Exp. Sta.* No. 142, 1954. pp. 5.

Tables based on measurements in the Central States are given showing: (1) d.b.h. in relation to stump diameter at 1-ft. height for two species groups; (2) average number of 16-ft. logs/tree by d.b.h. and four species groups and (3) gross volume by diameter and number of 16-ft. logs/tree. These data can be used to give an estimate of volume.

745. West-Nielsen, G. En grundflademåler. **[An instrument for measuring basal area.]** *Dansk Skovforen. Tidsskr.* 38 (9), 1953 (584–8). 1 ref. [Dan.]

Reports on a small-scale trial of Bitterlich's *Winkelzahl* method to determine how far this might replace the circular-sample-plot method. Fourteen plantations [no details given] were (*a*) completely enumerated to serve as the standard of accuracy, (*b*) partially enumerated on circular plots (4–10 per plantation), and (*c*) 'enumerated' by the *Winkelzahl* method (twice as many counts as there were plots in method (*b*)). Two observers were used, both of whom obtained better results from (*c*) than from (*b*). It is noted that (*c*) has a tendency to give overestimates for stands of low and under-estimates for those of high diameter—an effect possibly connected with differences in light, since poor light might be expected to cause the former, and good light the latter type of error in readings. In one hour 3 men can enumerate an average of 4·5 circular plots, while 1 man can make ca. 20 *Winkelzahl* counts; on this basis and at current Danish costs, (*b*) is ca. 5 times as expensive as (*c*) and the latter is thus worth serious consideration. Absolute and % deviations from the values given by (*a*) are tabulated for (*b*) and (*c*), and also for the *Winkelzahl* method using only as many counts as there were plots, which gave results somewhat inferior to those of (*b*).

522. *Height, Length*

746. Stiell, W. M., and Heaney, H. D. **A sectional magnesium[-alloy] height-pole.** *Silv. Leafl. For. Br. Can.* No. 82, 1953. pp. 2.

The pole consists of identical 4-ft. sections, marked at 1-ft. intervals, and a movable tube graduated downwards in feet and tenths of a foot as base (not used where readings to the nearest foot are acceptable). It has been used satisfactorily for measuring the heights of nearly 11,000 trees in plantations ranging from 15 to 40 ft., considered to be the maximum height suitable for measuring with the

pole. Diagrams showing details of construction are given.

524. *Determination of the Volume of Trees and Stands*

524.1. Principles of Volume Determination. Form (Taper)

See also Nos. 249, 743, 946.

747. PERKAL, J. O oznaczaniu objętości pni drzewnych. **[The determination of the volume of tree stems.]** *Prace Wrocławskiego Towarzystwa Naukowego* (*Ser. B*) No. 31, 1950. pp. 79. 10 refs. [Pol.] (Abridged English version in *Comptes Rendus de la Société des Sciences et des Lettres de Wrocław* Vol. 3, 1948, *Communication* No. 7.)

The nature and magnitude of the errors introduced by taper (Δ_1) and non-cylindricity (Δ_2) are discussed. Assuming these two errors to be independent of each other, the author next deals with the compound error $\Delta = \sqrt{(\Delta_1^2 + \Delta_2^2)}$. Conventional methods of measurement give $\Delta_2 = 5$–7%, while Δ_1 (in the Huber-Kästner method) is ca. 5%; hence Δ = ca. $7{\cdot}8\%$. For the optimum method (sectional area determined from the minimum and maximum diameter), $\Delta_2 \leqslant 2\%$, while Δ_1 does not exceed $3{\cdot}5\%$ for the best of the 'fractional-height diameter' methods; thus the least value of Δ so far attainable is ca. 4%.

A comparative analysis is made of the various known formulae for determining the sectional area and the stem volume. The author adds a simple single-parameter method of determining the latter. The height (h_{20}) is determined at which the least diameter of the stem is 20 cm., and the volume of the stem is read from a table giving the volume [for a given species and site?] as a function of h_{20}. It is claimed that, for 22 Spruce stems (tree-length logs) measured at Sobotka, this method gives Δ = ca. 7%. For different stands, different h_n might be chosen (e.g. h_{30}, the height at which the diameter = 30 cm.).

The author also gives an illustrated description of two new instruments which, theoretically, eliminate both Δ_1 and Δ_2. The latter error is eliminated by using the author's 'profilometer', an instrument enabling the sectional area to be integrated on a principle similar to that of a planimeter. The other new instrument is the 'mechanical xylometer', a sort of integrating caliper, a crude prototype of which gave a maximum discrepancy of ca. 5% compared with sectional-method measurements. The main sources of accidental error are knots. It is claimed that the theoretical error (always positive) of the 'profilometer' can be reduced to ca. 2%, and that of the 'mechanical xylometer' (also always > 0) to $0{\cdot}3\%$.

The use of the following methods for determining stem volume are recommended: (i) in the forest and sawmill, either the 'h_{20}' method, or the two instruments described, the 'profilometer' being of the automatic kind and mounted on the sawmill; (2) for the timber trade, the 'optimum' method (sectional area for one or two diameters, and the most suitable 'fractional-height diameter' formula), or, for valuable species, the 'mechanical xylometer', and (3) for research, sectional measurement with a 'profilometer'.

524.3. Volume of Tree Groups and Stands

See also Nos. 329, 744.

748. BØRSET, O. Kubering av osp på rot. **[Determining the volume of standing Aspen.]** [*Medd. norske Skogforsøksv.* 12 (3) (No. 43), 1954 (391–447). 25 refs. [Nor.nor.e.]

Gives volume tables for *P. tremula* in S. Norway based on measurement of 1262 trees, showing volume o.b. Volume u.b. can be found from a separate bark $\%$ table. There is a full English summary and tables and graphs have English legends.

749. JEFFERS, J. N. R. **Volume table for small hardwood trees [$2\frac{1}{2}$–6 in. q.g.b.h., height 10–45 ft.].** *For. Rec. For. Comm., Lond.* No. 28, 1954. pp. 9.

A supplement to the tables already published for Oak, Beech and Birch of 6 in. minimum q.g.b.h.

524.6. General Surveys of Forests and Whole Tracts of Forest. Partial Enumeration Surveys, Timber Cruising

750. ILVESSALO, Y. III valtakunnan metsien arviointi: suunnitelma ja maastotyön ohjeet. **[The Third National Forest Survey of Finland: plan and instructions for field work.]** *Commun. Inst. for. Fenn.* 39 (3), 1951 (1952). pp. 67. [Fi.e.]

With a 9-page English summary.

751. KINASHI, K. **Forest inventory by sampling methods.** *Repr.* from *Bulletin of Kyushu University Forests* No. 23, 1954. pp. 153. 106 refs. [E.]

Describes in detail the application of various methods of calculating timber volume on a sampling basis to a number of stands (conifer and hardwood, pure and mixed, natural and artificial) in Kyushu island, and analyses the results. The basic sampling units were 10×10 m. plots, which proved the most efficient. From the results practical recommendations are made for applying modern statistical methods to Japanese forestry. There is a short history of their introduction in Japan and a bibliography of Japanese and other literature.

525. *Volume by Assortments. Merchantable Volume*

See also No. 744.

752. MCCLAY, T. A. **Loblolly Pine topwood volumes.** *Res. Note Stheast. For. Exp. Sta.* No. 61, 1954. pp. 2.

Tables are given showing topwood volume per tree for different top diameters of sawtimber and topwood for diameter classes ranging from 10 to 20 in., and per 1000 bd. ft. sawtimber.

753. PRIEELS, H., JR. Les vices cachés dans les bois sur pied. **[Hidden defects of standing timber.]** *Bull. Soc. for. Belg.* 61 (7), 1954 (323–6). [F.]

A review of the principal defects likely to be encountered when buying timber on the stump.

754. HESTERBERG, G. A. **Cull in Sugar Maple increased by breakage of large limbs during logging.** *Tech. Note Lake St. For. Exp. Sta.* No. 417, 1954. pp. 2.

Tabulated figures are given showing cull in Sugar Maple logs from limbs broken 20 years earlier, with the type of defect (white rot, brown rot and green discoloration). Greater care during partial cutting is recommended.

526. *Log Measurement. Scaling*

See No. 747.

527. *Solid Volume of Stacked Products*

755. GLÄSER, H. Die fotografische Methode zur Festgehaltsermittlung von Schichtholz. [**The photographic method of determining the solid wood volume of stacked wood.**] *Papier, Darmstadt* 6 (23/24), 1952 (524–6). 1 ref. [G.] L.S.

A slight modification of Mountain's dot-count method [see *For. Abstr.* 11 (No. 1521)] gave results < 1% different from those obtained xylometrically.

756. CARRON, L. T. **Measurement of stacked firewood.** *Aust. For.* 17 (2), 1953 (43–8).

Every piece of wood in 84 standard (8 × 4 × 4 ft.) cords of firewood cut from three blocks totalling 5 acres of Eucalypt firewood forest at Black Mountain, Australian Capital Territory, was measured to derive a reliable estimate of solid content per average cord. Some of the material was weighed to obtain an estimate of weight per average cord. Average cords showed a variation from 55 to 66 cu. ft. solid content, and from 27 to 35 cwt. (after 2½ months of summer drying). A value per cord of ca. 62 cu. ft. solid content, and 32 cwt. (under similar drying conditions) is suggested as a reasonable estimate for the area. Some of the factors affecting solid content and weight of stacked firewood are discussed. *From author's summary.*

53. SPECIAL MEASUREMENTS OF TREES AND STANDS (CROWN DIMENSIONS, STAND DENSITY ETC.)

See also No. 775.

757. PEARCE, S. C. **Studies in the measurement of Apple trees. 1. The use of trunk girths to estimate tree size.** *Rep. E. Malling Res. Sta. 1950/51*, 1952 (101–4). 13 refs.

A study was made of the relationship between trunk girth and tree weight in a series of trials with bush Apple trees. In manurial trials, at least with varying amounts of K, trunk girth is an adequate measure for estimation of tree weight.

54. ASSESSMENT OF SITE QUALITY

See also No. 356.

758. ZAHNER, R. **Estimating Loblolly Pine sites in the Gulf Coastal plain.** *J. For.* 52 (6), 1954 (448–9). 1 ref.

The previous work on *Pinus taeda* [cf. *For. Abstr.* 15 (No. 1652)] is now extended with some modification to S. and Central Louisiana and S.E. Texas, with data from 141 stands. The regression equation for this area is:—Log S.I. $= C + 0{\cdot}00156D + 0{\cdot}00679(IWV) - 0{\cdot}000368IWV^2$, where $C =$ 1·8872 or 1·9124 for sites of good or poor drainage respectively; D = depth to subsoil (in.); IWV = imbibitional water value of subsoil. A table relates 3 subsoil consistency classes (divided into good and poor surface drainage) with surface soil depths to 10, 20 and over 20 in. for use in auger sampling.

759. CARMEAN, W. H. **Site quality for Douglas Fir in southwestern Washington and its relationship to precipitation, elevation and physical soil properties.** *Proc. Soil Sci. Soc. Amer.* 18 (3), 1954 (330–4). 10 refs. O.R.E.

Even-aged, second-growth stands were sampled and total age, total height of dominant trees, slope, aspect, elevation, topographic position, soil depth, soil consistency, and total annual precipitation were recorded. Moisture equivalent and gravel content were determined for all soil horizons and, also the imbibitional water values of the substratum (C horizon). The physical soil values and observed stand characteristics were then assembled in a multiple regression expressing tree height in terms of tree age and associated quantitative environmental conditions. The results of this statistical analysis are as follows: (1) Site quality decreases with an increase in elevation and with an increase in the gravel content and compaction of the soil layers above the substratum. (2) Site quality increases with an increase in total annual precipitation and with an increase in depth to the substratum. Increased site quality also occurred with an increase in the product of moisture equivalent and gravel content of the soil layers above the substratum, this indicating that the adverse effect of gravel is not as pronounced with fine-textured soils. (3) The above relationships are expressed by means of regression equations calculated for each of 5 different soil groups. Site tables suitable for field use in the identification of Douglas Fir site quality may be prepared from these equations. *From author's summary.*

760. SARVAS, R. Tutkimuksia puolukkatyypin kuusikoista. [**Investigations into the Spruce stands of *Vaccinium* type.**] *Commun. Inst. for. Fenn.* 39 (1), 1951 (1952). pp. 82. 83 refs. [Fi.e.]

The purpose of this study was to determine what changes occur in ground vegetation of the *Vaccinium* type when Spruce is substituted for Pine, and the comparative yield of Spruce and Pine on such sites. Comparison of vegetation in Spruce and Pine stands showed that Spruce has a more noticeable influence on the vegetation of the *Vaccinium* than of the *Myrtillus* type, probably because under Pine the ground vegetation of the former is more light-demanding than in the latter, so that the heavy shade of Spruce has more effect on it. A comparison of yields showed that the yield of Spruce is generally lower than that of Pine on all sites in the area under investigation (S.W. Finland), but that the difference is much greater on *Vaccinium* types, where maximum c.a.i. for Spruce is 2·5 cu.m./ha. (reached at ca. 100 years) and for Pine 4·7 cu.m./ha. (reached at ca. 85 years). The yield of Spruce is thus only 53% of that of Pine. On stands of *Myrtillus* type the proportion is 84%. It is concluded that the growing of Spruce on *Vaccinium* type sites is uneconomic.

56. INCREMENT, DEVELOPMENT AND STRUCTURE OF STANDS

See also Nos. 123, 125, 159–61, 188, 192, 332, 336, 358 *et seq.*, 462 *et seq.*

761. ERTELD, W. Über die zukünftige Arbeit auf dem Gebiet der Ertragskunde. **[Future work in the study of yield.]** *Arch. Forstw.* 2 (4/5), 1953 (432–42). [G.]

Though the 280 yield plots in Eastern Germany are useless for tracing the course of increment in uneven-aged stands, they should be retained for the solution of other outstanding problems. The emphasis should now be on increment tables derived from new plots of good regional representation. The chief lines of future research are: (1) biological and biometrical observations on trees and stands to reduce growth to laws and mathematical functions; correlations of growth of crown, foliage and roots with bole increment; stem form; effects of treatment on the stand; (2) differences in growth rates in relation to disease-, snow- and wind-resistance; properties of wood; field recognition of characters indicating the most thrifty trees; distribution patterns of thrifty and unthrifty trees on the ground; (3) revision of present site classifications with greater attention to macro- and micro-climate; (4) proper relation of stand density and increment (not, as so often assumed by yield table users, adjustable by proportional reduction); (5) increment of exotics (Robinia, Hickory, *Pinus strobus*, *P. nigra* var. *austriaca*, *Abies concolor*, *Larix leptolepis*, *Picea sitchensis*, *Tsuga heterophylla*, and *Juglans regia*); (6) Further examination and use of statistical methods, particularly circular-plot sampling.

762. MCCORMACK, R. J. **Forest growth in the Upper Lièvre river valley, 1930 to 1951. Project H-80.** *Silv. Leafl. For. Br. Can.* No. 92, 1953. pp. 4. 4 refs.

A description of development in 3 major forest types, Jack Pine/Black Spruce, mixed forest, and Spruce/Fir.

763. METEER, J. W. **Growth and stand data from continuous inventory [in a mixed hardwood stand].** *For. Mimeo. Ohio agric. Exp. Sta.* No. 2, 1953. pp. 2.

Number of trees, growth and cut (in bd. ft.) for 3 enumerations; selection-type forest, 80% Beech and Hard Maple, cut annually.

764. METEER, J. W. **Mortality in Ohio hardwoods.** *For. Mimeo. Ohio agric. Exp. Sta.* No. 3, 1953. pp. 3.

Data from sample plots in 5 mixed hardwood stands show that annual mortality ranges from 0 to 55 bd.ft./acre.

765. DAWKINS, H. C. **High-forest trees—increment.** *Tech. Note For. Dep. Uganda* No. 4/54, 1954. pp. 1.

Preliminary estimates from an untreated tree-increment plot in Mabira forest show the following m.a.i. in inches girth above buttresses: Large-crowned emergents 1·0 and respectively for large-, medium- and small-crowned trees of (*a*) the main canopy and (*b*) the understorey: (*a*) 0·53, 0·44, 0·27, (*b*) 0·41, 0·13, 0·12.

766. WADSWORTH, F. H. **New observations of tree growth in Tabonuco forest.** *Carib. For.* 14 (3/4), 1953 (106–11). 11 refs.

[Cf. *For. Abstr.* 15 (No. 2752).] Further observations have been made on sample plots in both virgin and secondary forest in the Luquillo Mountains. Position in the canopy is not related to growth rate, but many species have strong micro-environmental preferences. Several species show a clear preference for either moist, or well drained sites within the forest, and generally do not grow rapidly off these sites. Height growth tends to be most rapid in trees of rapid diam. growth, and the latter is probably a good index of total increment.

767. HILEY, W. E., and LEHTPERE, R. **Redwood (*Sequoia sempervirens* Endl.) at Dartington.** *Quart. J. For.* 48 (3), 1954 (204–5 + 1 photo).

A stand of Redwood at Dartington, Devon, of ca. 1 acre, planted 20 years ago, has grown faster than any other recorded coniferous plot in Britain. The total yield is 6136 Hoppus ft. u.b./acre, which corresponds to an m.a.i. of 307 H.ft. The c.a.i. during the last 5 years was 574 H.ft. The bark % is 14·1, which appears low for this species. *Authors' summary.*

768. KLEPAC, D. Komparativna istraživanja debljinskog, visinskog i volumnog prirasta u fitocenozi jele i rebrače. **[Comparative investigations on diameter, height, and volume increment [of Silver Fir] in the association *Abieto-Blechnetum*.]** *Šum. List* 78 (2/3), 1954 (83–110). 49 refs. [Croat.f.]

The investigations were conducted in 4 experimental plots of 1–21 ha., two being on better-quality sites than the others. Two stands were of the selection type, and the others intermediate in structure between regular and selection forest. Basal area varied from 23·8 to 44·7 sq. m./ha. The increment of *Abies alba* was based on 1267 increment cores and measurements of the height of 1319 trees. Equations of the type $\Delta d = A + Bd + Cd^2$ (Δd = diameter m.a.i., d = d.b.h., and A, B, and C are constants) were derived for each stand. The recruitment period was then calculated. Height m.a.i. was determined by an adaptation of Lachaussée's formula and, finally, the volume increment was calculated, making use of yield tables and the recruitment period. The final conclusions reached lead to a dilemma: a selection-system stand gives a greater yield with a lower wood quality, whereas the regular stand gives a lower yield but the wood quality is better. The first alternative is recommended, the quality of wood to be improved by using the group selection system.

769. GIBBS, J. A. **Planted White Pine makes good growth at Mohican.** *For. Mimeo. Ohio agric. Exp. Sta.* No. 7, 1953. pp. 1 + plate.

Measurements made in a 20-year-old plantation of *Pinus strobus* on a typical abandoned hillside field, showed average d.b.h. 5·8 in., average height 36 ft., and mean c.a.i. 1·5 ft.

770. MIRKOVIĆ, D. Essai sur l'accroissement du hêtre dans la réserve de l'Ostrozoube. **[Study on increment of Beech in the Ostrozub reserve.]** *Bulletin*

de l'Académie Serbe des Sciences, Sciences Naturelles (*n.s.*), *Beograd* 12 (3), 1953 (52). [F.] L.S.

Measurements on Beech show that it grows fairly rapidly, but with annual increments rather below average, to 140 years in this natural forest 1250 m. above sea level. The character and structure of the timber are similar to Beech in W. Jugoslavia which has been studied in detail.

771. GIBBS, J. A. **Tulip Poplar outgrows Ash.** *For. Mimeo. Ohio agric. Exp. Sta.* No. 6, 1953. pp. 1 + 1 plate.

Periodic studies of a mixed plantation of *Liriodendron tulipifera* and *Fraxinus americana* have shown that the former has made much more rapid growth than the latter in the first 18 years (average d.b.h. 5 in. and 1·2 in., maximum height 45 ft. and 31 ft. respectively).

772. GURGEL, O. A. Observações no arboreto do Horto Experimental de Santa Rita do Passa Quatro. I. Nota sobre amendoim bravo (*Pterogyne nitens* Tul.). [**Observations on the arboretum of the Experimental Garden of Santa Rita do Passa Quatro. I. Note on *P. nitens*.**] *Rev. Agric., Piracicaba* 29 (5/6), 1954 (193–5). 2 refs. [Port.] A.P.B.

A study of height and diameter growth in young trees of *P. nitens*.

773. **Rate of growth of Teak (*Tectona grandis*).** *Rep. For. Dep. Sudan 1952/53*, 1954 (42–3, 46–50).

Measurement of sample plots of Teak in different parts of the southern Sudan (rainfall 1000–1200 mm.) shows that, in general, diameter growth is rather better than for trees of the same height growth in India. On the better sites growth is equal to All-India quality II, which is the first quality of the Nilambur plantations in Madras. Even the lower-quality Teak has already produced a considerable revenue from thinnings, as its straight clean poles are in high demand.

561. *Increment in Height, Diameter, Basal Area, Form and Quality. Variations and Trends; Dendrochronology*

See also Nos. 249, 264, 467, 946.

774. ERMICH, C. **The influence of climatic factors upon the growth of the English Oak (*Quercus robur* L.) and Scots Pine (*Pinus sylvestris*).** *C.R. Sci. math. nat. Acad. polon.* Nos. 5/10, 1951 (1952), (63–4). [E.] O.R.S.

775. DEETLEFS, P. P. DU T. **The relationship between stand density, crown size and basal area growth in stands of *Pinus taeda* in the native habitat of this species.** *J. S. Afr. For. Ass.* No. 24, 1954 (1–28). 23 refs.

Regression equations are derived in which relationships are established between stand density, crown size and basal-area growth in pure, even-aged stands of *P. taeda* in the Piedmont of North Carolina. The findings are based on observations on 129 $\frac{1}{10}$-acre sample plots of variable stocking, age, and site index. It is shown that: Single trees of given d.b.h. make more than twice as much basal-area growth when b.a./acre is 60 sq. ft. as when it is 140 sq. ft. Single trees of large diameters may make more than twice as much b.a. growth as trees of relatively small diameters when b.a./acre is fixed. B.a. growth/acre generally increases as the stocking declines from 140 to 60 sq. ft./acre. However, b.a. growth/acre at relatively high stockings may be greater than at lower stockings when the average d.b.h. of the trees at the high b.a. is comparatively small. B.a. growth/acre at any fixed stocking in b.a./acre increases as the number of trees/acre increases from 50 to approximately 350. After that, higher counts per acre are not associated with significantly greater b.a. increments. B.a. growth/acre decreases linearly as stand age increases from 20 to 60 years, when number of dominant and co-dominant trees/acre, and b.a./acre, remain constant. The rate of b.a. increment of single trees increases generally as stand age increases from 20 to 60 years. There is a marked levelling off in the rate of increase after the 35th year. The rate of increase is greatest in stands maintained at relatively low b.a. (through a reduction in numbers of trees as b.a. per tree increases). B.a. increment/acre increases proportionally as site index increases from 60 to 100 when other independent variables are at their mean values. The relative crown-surface area of single trees of a given d.b.h. is nearly four times as great when b.a./acre is 60 sq. ft. as when it is 160 sq. ft. B.a. increment/acre increases linearly with relative crown-surface area when other independent variables are at their mean values. A fixed relationship exists between relative crown-surface area and crown length when the latter is expressed in % of tree height. *From author's summary.*

776. NYYSSÖNEN, A. Puiden kasvusta ja sen määrittämisestä harsintamänniköissä. [**On tree growth and its ascertainment in selectively cut Scots Pine stands.**] *Commun. Inst. for. Fenn.* 40 (4), 1952. pp. 20. 18 refs. [Fi.e.]

A study was made of the vertical distribution of increment in the stems and the reliability of increment values obtained from sample trees, in stands cut to a diameter limit. Stem analyses were made in 4 even-aged *Pinus sylvestris* stands of *Vaccinium* site type, analyses being made of 28 trees judged to be representative of each stand. The stands were aged ca. 56, 70, 81, and 92 years respectively. It was found that cuttings had improved the d.b.h. increment of all stands. A similar, but considerably slower, reaction was observed higher up the stem, with the result that those stems that were relatively well formed at the time of cutting showed a deterioration in form.

562. *Volume Increment*

See also No. 795.

777. BICKFORD, C. A. **The place of individual-tree data in estimating growth.** *J. For.* 52 (6), 1954 (423–6). 2 refs.

A statistical investigation into the accuracy and cost of successive sampling of mixed woods by plots by (*a*) individual tree data and (*b*) species/diam. tally. For equal accuracy (*a*) requires only 60–65% of the area required by (*b*) but costs 30% more. A compromise is advisable and has been adopted in the U.S. Survey of the Northeast in which a sample

of stems is recorded individually on the plots which are recorded as a whole by (*b*).

778. Čokl, M. Prehodna doba in njena uporaba v izmeri prirastka. **[Recruitment period and its use in the determination of increment.]** *Gozd. Vestn.* 12 (1/2), 1954 (1–15). 6 refs. [Sloven.g.]

Describes methods of determining volume increment which take into account height- and the form-factor increment as well as diam. increment, viz. those of Pipan, Hufnagl, and the Bourgenot-Chatelain modification of the Lachaussée method. Suggests a new method in which the increment of a 5-cm. diameter class is determined from the formula $[(V_{d+2\cdot5} + V_{d-2\cdot5})\,N_d]/T_d$, where d is the middle of the diam. class, V are the 'tariff' volumes, T is the recruitment period, and N, the number of stems.

566. *Yield Tables and Their Construction*

See also Nos. 329, 463.

779. Bedell, G. H. D. **Forestry branch yield studies [with discussion].** *Woodl. Sect. Index Canad. Pulp Pap. Ass.* No. 1371 (*F*-2), 1954. pp. 3 + 12.

Outlines the method of the Ontario Research Unit in preparing yield tables from yield plot studies for stands of different density in a given cover type and site group.

780. Møller, C. M., and Nielsen, J. Afprøvning af de bonitetsvise tilvækstoversigter af 1933 for bøg, eg og rødgran i Danmark. **[Testing of the 1933 Danish yield tables for Beech, Oak and Norway Spruce.]** *Dansk Skovforen. Tidsskr.* 38 (1), 1953 (1–176). [Dan.e.]

A detailed report on a critical study of the standard Danish yield tables (Møller, 1933) on the basis of extensive data from the permanent sample plots of the Forest Experiment Station, along with data supplied by the Hedeselskab, individual forest districts and the management branch of the state forests. The results are given in separate chapters for each of the species, and succeeding chapters deal with special topics, viz. the general adequacy of the tables in the light of the data and the influence of thinning grade on height increment, site quality class, and volume increment. There is a 10-page general summary in English and legends of all graphs and some important tables are given in English as well as Danish.

On the whole, although the tables appear to give certain minor errors in b.a. increment and form factors (along with some discrepancies as regards height increment, for which the tables may well be more representative than the check data) it is considered inadvisable to alter the tables in the present state of knowledge. On the vexed question of the possible influence of thinning grade upon volume increment no safe correlation could be established within the range of thinning grades normally applied in practice.

568. *Other Mensurational Studies of Stand Constitution and Changes Therein. Distribution of Growth by Tree Classes etc.*

781. Magin, R. Ertragskundliche Untersuchungen in montanen Mischwäldern. **[Studies of yield in montane mixed forests.]** *Forstwiss. Cbl.* 73 (3/4), 1954 (103–13). 8 refs. [G.g.]

Data were collected on sample plots of 0·4–0·6 ha. (according to density of stocking) in mixed Norway Spruce, Silver Fir and Beech stands on different sites, and figures and/or curves are presented showing (1) number of stems and b.a./ha. by species and diameter classes, (2) scatter of crown area of different species of different diameter classes, (3) average crown area for different diameter classes of Spruce and Fir in relation to b.a. increment over the last 5 years, and (4) basal area and volume increment of Spruce and Fir of different diameter classes related to crown area. Such data can provide a reliable picture of the composition and constitution of stands of this kind.

58. SURVEYING AND MAPPING. AERIAL SURVEYS

See also Nos. 278, 282, 795, 807–8.

782. **[Identification of species on air photographs.]** *Rep. For. Dep. Sudan 1952/53*, 1954 (32).

A tentative scheme has been drafted for the interpretation and annotating of the main forest types. The identification of species is difficult, but it is possible to distinguish *Isoberlinia doka* forest with reasonable accuracy and some progress has been made in the recognition of *Khaya senegalensis* in savanna forest. Work has been on photographs on a scale of 1/16,000 and better results are expected from sample strips at 1/12,000.

783. Rey, P. Esquisses photogrammetriques. **[Photogrammetric sketches.]** *Trav. Lab. for. Toulouse* 1 (5), Art. 14, 1953. pp. 7. [F.]

Notes on the construction and use of sketch maps made on thin tracing paper laid over air photographs.

784. Clauser, F. L'allestimento di mappe forestali con metodo aerofotogrammetrico. **[The preparation of forest maps from air photographs.]** *Ital. for. mont.* 9 (3), 1954 (168–71). [It.]

Describes the methods employed and costs of a map on a scale of 1 : 10,000 of some 20,000 ha. of forest in the mountains of Udine—the first map to be made in Italy from air photographs.

785. King, J. E. **Forest service procedure of utilizing high and low altitude photography in its companion-instrument photogrammetric procedure. [With discussion.]** *Photogramm. Engng.* 19 (1), 1953 (88–97). L.S.

Describes the procedure developed by the U.S. Forest Service, using small-scale, high-altitude photographs in the Kelsh Plotter for horizontal and vertical control, and larger-scale photographs in the KEK stereoscopic plotter for map construction and detail.

786. Moessner, K. E. **Photo interpretation in forest inventories.** *Photogramm. Engng.* 19 (3), 1954 (496–507). 14 refs. L.S.

Reviews the history and development of the use of aerial photographs in forest inventory. [Cf. *For. Abstr.* 16 (No. 3246).]

787. Johnson, E. W. **Shadow-height computations made easier.** *J. For.* 52 (6), 1954 (438–42).

Describes the use of computation sheets to reduce

calculations of shadow-length/tree-height ratios to a mechanical process, eliminating the need to understand underlying principles.

788. HEINSDIJK, D. Begroeiing en luchtfotografie in Suriname. **[Vegetation and air-photographs in Surinam.]** *Publicatie van het Centraal Bureau Luchtkaartering te Paramaribo* No. 12, 1953. pp. 19 + 2 tbls. 7 refs. With map supplement. pp. 12. [Du.]

Discusses the division of the area into swamp and dry-land forest, and for the latter lists the principal species, and discusses soil, plant associations and the trees in the upper and lower canopy. Includes a list giving the native and scientific names of the main trees and shrubs and a table comparing the vegetation types with those in literature.

The supplement consists of 12 maps showing the distribution over sample plots of *Dicorynia paraensis*, *Eperua falcata*, *Eschweilera longipes*, *E. corrugata*, *Sclerobium melinonii*, *Couratari* spp., *Goupia glabra*, *Tetragastris* spp., *Qualea rosea* and *Vochysia tetraphylla* (?), *Ocotea rubra*, *Vochysia* and *Qualea* spp. and *Swartzia* spp.

6. FOREST MANAGEMENT. BUSINESS ECONOMICS OF FORESTRY. ADMINISTRATION AND ORGANIZATION OF FOREST ENTERPRISES

789. CHAMPION, H. G. **[Review of *W. E. Hiley*: 'Woodland Management'.]** *Forestry* 27 (2), 1954 (149–52).

Cf. *For. Abstr.* 15 (No. 2770).

790. DAVIS, K. P. **American forest management.** McGraw-Hill Book Co., Inc., New York. 1954. pp. xiii + 482. 244 refs. Price $7·50 (£3).

Part I (foundations of management) contains chapters on: site, stocking and spacing; the use of yield tables; estimation of increment; nature, growing stock, and yield of the fully regulated forest; determination of the cut; regulation of even-aged forests; nature and structure of uneven-aged management—case analyses; determination of the rotation; organization and subdivision of the forest for management; timber-management planning and plans. Part II (valuation) covers: principles of valuation; interest and investment; the arithmetic of interest; valuation of forest land and the timber stand; valuation of stumpage; valuation of the tree; valuation of financial alternatives; appraisal of damage.

61. FOREST MANAGEMENT: GENERAL, THEORY AND PRINCIPLES

791. BENIĆ, R. Ekonomična veličina odjela u nizinskim šumama promatrana sa gledišta eksploatacije šuma. **[The economic compartment size in lowland forests from the standpoint of forest extraction.]** *Šum. List* 78 (4), 1954 (174–82). 5 refs. [Croat.croat.e.]

Different formulae are derived for calculating in lowland forests the compartment size for which the logging costs/cu.m. of wood assortment reach the minimum figure.

62. WORKING PLANS. ANNUAL OR PERIODIC YIELD. YIELD REGULATION

See also No. 1322.

792. SCHREVEL, M. Voorbeeld van een bedrijfsregeling. **[Example of a working plan.]** *Ned. Boschb.-Tijdschr.* 26 (8), 1954 (197–215). 5 refs. [Du.]

Discusses the data necessary for preparing a working plan, and gives an example from practice in the Netherlands.

793. DAWKINS, H. C. **The productivity of Uganda high-forests.** *Tech. Note For. Dep. Uganda* No. 3/54, 1954. pp. 3.

The present merchantable increment from the 1500 sq. miles of productive reserves is 40,000 Hoppus tons [= 50 H.ft.] of which 10,000 are not yet taken up. Annual consumption, at present 0·01 ton/person, should be 0·10 within the next 50- to 80-year rotation. The required increase can be obtained by planting; by improving the utilization of *Celtis*, *Chrysophyllum*, *Alstonia* and *Cynometra*, which would quadruple merchantable yield; and by increasing the number and increment of currently valuable species, e.g. Mahoganies, which could give the same result. Basic problems are: primary and successive sampling, for the latter of which no adequate method has been evolved; growth measurement, the existing data for which are full of anomalies on which published literature sheds no light (the growth rates of all species under all conditions is required); the silvicultural reactions of the growing stock e.g. to pre- and post-exploitation treatments, felling intensities, minimum girths, felling damage, and shrub and climber cutting. The solution of these problems (which involve new techniques) is urgent, as the reserved areas are only likely to be secured if they can be shown to earn their keep.

794. BRASNETT, N. V. **Management records: the maintenance of histories of forest management units in the British Commonwealth.** *Inst. Pap. imp. For. Inst., Oxf.* No. 30, 1954. pp. 82. Price 6*s*.

Compiled from information supplied by Commonwealth Forest Departments in accordance with a resolution of the 5th British Commonwealth Forestry Conference. The bulletin is divided into two main sections: I. The unit of record: (*a*) in natural forests, (*b*) in plantations and other intensively managed uniform forests. II. The information recorded: (*A*) recording by administrative reports, control books, reserve registers etc., (*B*) recording by compartment histories or registers. Finally there are some general observations on the replies to the inquiry, a general outline of organization for recording by units, and the procedure for making entries.

795. HOUGH, A. F. **The control method of forest management in an age of aerial photography.** *J. For.* 52 (8), 1954 (568–74). 48 refs.

Reviews the history of the *méthode du contrôle* and details a technique for its cheap application with the help of statistical sampling and air photography, drawing largely on Bickford [cf. *For. Abstr.* 13 (No. 4082)]. Yield for the cutting cycle is got by plotting on semi-logarithmic paper the diam. distribution at the beginning and at the end of the cycle, the latter being projected from increment data. Liocourt's quotient ('q') is then calculated for the latter and reduced as advised by Meyer [cf. *For. Abstr.* 12 (No. 3532)]. The straight line representing the reduced 'q' is then drawn and the number of trees available for felling in each diam. class read from the differences. In the example given from the working plan of the Alleghany working circle, the 'q' of 1·85 is reduced to 1·75. The long-term goal is a 'q' of 1·5, approaching that of the Swiss forests. Data for the number of plots (photo and ground) and costs for the initial and continuous inventory of a 700,000-acre area are given.

64. FORESTRY AS A BUSINESS: GENERAL

796. BEST, A. L. **Economics of forest management: a study of the costs of sustained yield forest management on the Sault au Cochon management unit, at Forestville, Quebec.** *Bull. For. Br. Can.* No. 112, 1954. pp. viii + 96 + 13 maps.

An economic study is conducted on a forest area of 1000 square miles in eastern Quebec. It is assumed that the area is to be managed for the continuous production of pulpwood, and a forest management plan providing for a 90-year rotation has been drawn up. Allowable cuts, averaging 85,000 cords annually, have been allocated by periods throughout the first rotation. Based on a defined series of improvements, adequate physical developments are planned for the management unit, and their original cost and annual maintenance charges are taken into account. Costs for each phase of the logging operation from stump to holding ground are expressed in terms of 1950 dollars; by years for the first decade and by periods for the second and third decades of the first cutting cycle, and by cycles for the second and third cycles of the first rotation. A comparative valuation of the management unit in 1950 and at the end of the first rotation shows a capital gain on the original investment of 109%.

In addition, an increase of 21% in the average annual yield is estimated for the second rotation, when the overmature timber will have been removed and cutting will be restricted to the mature age-classes. A further increase in yield of at least 20% may be attained in the second rotation by silvicultural treatment of stands of timber before they reach maturity. This will be made possible by increased accessibility of all parts of the area, and by a permanent trained labour force which can be developed because the area is to be permanently productive. The above evaluation of future prospects is conservative because all the potential benefits of sustained yield management have been ascribed to the second rotation, or to a period starting 90 years hence. In actual practice, many of these benefits can be realized during the third cutting cycle of the first rotation and, to some extent, even before that time. *Author's summary.*

797. **Factors affecting the size of a sustained yield management unit: a panel discussion.** *Pulp Paper Mag. Can.* 55 (8), 1954 (140 . . . 152).

Contains papers on: Forest type and species (*R. R. Douglas*); Products, markets and mills (*J. B. Millar*); Topography, soil and research (*A. Bickerstaff*); Waterways and roads (*J. B. Springer*); and Location with respect to settlement (*W. L. Johnson*).

65. SPECIAL BUSINESS PROBLEMS OF TIMBER-GROWING. CALCULATION OF COSTS AND PROFITABILITY. VALUATION

See also Nos. 352, 462, 466, 468, 470, 574–5.

798. LAURIE, M. V. **Forestry practice in Britain. The mature crop—rotation and production.** *Wood* 19 (9), 1954 (363–5).

Discusses different factors in calculating rotation age, and discusses the production to be expected from the main species grown in Britain.

799. HERMANSEN, N. K. Omdriftsbestemmelsens dynamik. **[The 'dynamics' of the determination of [financial] rotation.]** *Dansk Skovforen. Tidsskr.* 38 (4), 1953 (303–42). 6 refs. [Dan.dan.]

The calculated financial rotation—even with its uncertainties and even though the necessities of practice often make it inapplicable—expresses *inter alia* the amount of capital invested in the growing stock, hence it is of interest to study the manner in which this calculated rotation will vary with variations in the values of the factors used in the calculation. This is done for the individual factors of the financial-rotation formula given in a previous paper [see *For. Abstr.* 14 (No. 572)] by differential analysis, and the results are discussed and illustrated graphically. It is stressed that such analyses can deal only with the isolated effects on the calculated rotation of individual factors in a wider economic complex in which these and other factors interact, so that they cannot give a definite answer to the adjustment of the rotation to a particular change in practice.

800. STRIDSBERG, E.; HERMANSEN, N. K. Omdriftsbestemmelsen. **[The determination of [financial] rotation.]** *Dansk Skovforen. Tidsskr.* 38 (11; 12), 1953 (617–31; 675–84). 11 refs. [Sw.sw.; Dan.dan.]

Criticism by Stridsberg of papers by Hermansen and Jørgensen [see preceding abstract], and reply by Hermansen demonstrating that the criticism rests upon misapprehensions, particularly as regards the treatment of the value of the soil and the difference between theoretical long-term calculations and those which are made for an actual, existing stand.

801. SCHREVEL, M. Beschouwingen over de omloop van Douglas. **[The rotation of *Pseudotsuga taxifolia*.]** *Ned. Boschb.-Tijdschr.* 26 (7), 1954 (174–85). 9 refs. [Du.]

Calculates for Douglas Fir in the Netherlands the physical, max. volume, financial (at 2, 3, 4 and 5%), and max. income rotations.

802. MacGregor, J. J., *et al.* **Survey of private forestry costs: England and Wales: Second annual report for forest years 1951–52 and 1952–53.** Imperial Forestry Institute, Oxford. 1954. pp. 98.

[Cf. *For. Abstr.* 15 (Nos. 2777–8).] Includes analysis of representative costs up to and including the fourth year after planting (initial establishment, beating up, weeding).

803. Smith, J. H. G. **The economics of pruning.** *For. Chron.* 30 (2), 1954 (197–214). 23 refs.

Considers the costs and possible profit in pruning, and concludes that for site-III Douglas Fir pruning is profitable in all d.b.h. classes from 4 to 22 in. Factors affecting lumber value of pruned trees are illustrated by examples of Douglas with and without natural pruning. *From author's summary.*

804. Smith, R. C. **Valuation of standing timber in the United States.** [*Pre-issue*] *Proc. Congr. int. Union For. Res. Organ., Rome 1953* Section 31 (No. 3), 1953. pp. 4. [E.] Limited distribution.

Gives and discusses equations for calculating the value of immature stands by the discount method and the stumpage value of merchantable stands.

66. COSTING OF LOGGING OPERATIONS

See Nos. 336, 567, 791.

67. ASSESSMENT OF FINANCIAL RESULTS; BOOK-KEEPING AND ACCOUNTANCY; BUSINESS STATISTICS; SHORT-TERM PLANNING AND FINANCING

See No. 742.

68. ADMINISTRATION AND ORGANIZATION OF FOREST ENTERPRISES

805. Orell, B. L. **Administrative management of a large state forestry department.** *J. For.* 52 (6), 1954 (403–7).

A comprehensive account of the fundamentals in the administration of the Washington department, covering organization, the personnel, programme, public relations, co-operation with industry and other government departments and the deep study of human behaviour involved in getting the respect and confidence of society in support of conservation objectives. Seventy % of the work load is in fire protection. Great emphasis is placed on decisions at local level.

806. Mackay, J. H. Ayukan daji cikin lardin Katsina. [**Forestry work in Katsina, [N. Nigeria**].] [Forest Department, Nigeria.] [1953.] pp. 41 + 1 map. [Hausa]

Instruction manual for African foresters. With 5 appendices in English.

687. *Planning and Organization of the Transport of Men, Supplies and Equipment*

807. **The use of aircraft in agriculture in the U.S.A.** Organization for European Economic Co-operation, Paris. No. *TAR*/107 (53) 1, 1953. pp. 103 + 8 photos. 14 refs. Price 6*s.*

The report of Technical Assistance Mission No. 107. Covers uses of aircraft for pest control, fertilizing, sowing, aerial photography, forestry, meteorology etc., research and costs, planning of operations, and equipment.

808. Rotherham, G. A. **The use of helicopters in woods operations.** *Pulp Paper Mag. Can.* 55 (7), 1954 (146 . . 155). (*Woodl. Sect. Index Canad. Pulp Pap. Ass.* No. 1374 (*A*-2-*a*).)

Discusses various uses including fire-fighting, timber cruising, rescue work, spraying and freight carrying.

7. MARKETING. ECONOMICS OF TRANSPORT AND THE WOOD INDUSTRIES

809. La madera, su producción y sus mercados. [**Wood—production and markets.**] *Chile maderero* 4 (4), 1954 (1 . . . 38). [Span.]

A review of the Chilean situation—forest resources (with brief descriptions of forest types), exploitation, timber production, transport, home and foreign markets, prices and wood-using industries.

71. MARKETING OF FOREST PRODUCTS: GENERAL

See No. 508.

72. THE QUANTITATIVE ASPECTS OF MARKETING. DEMAND, CONSUMPTION AND SUPPLY

See also Nos. 189, 1297, 1304.

810. **Timber statistics for Europe, including market reports, for January-March, 1953 and 1954.** *Quart. Bull. Timb. Statist., FAO* 7 (1), 1954. pp. 131 + 3 pp. suppl.

811. **T.D.A. year book of timber statistics 1953.** Timber Development Association, London. 3rd ed., 1954. pp. 55.

Cf. *For. Abstr.* 14 (No. 2564).

812. Silvy-Leligois, P. La pénurie des ressources européennes en bois de chênes de placage. [**The shortage of European supplies of Oak for plywood.**] *Rev. for. franç.* 6 (8/9), 1954 (501–10 + 4 photos). [F.]

Gives figures for supplies available from Jugoslavia, Germany and France, and for the European demand.

813. Holopainen, V. Britannian kaivospuun tuonnin näköaloista. [**The trend of United Kingdom imports of pitwood.**] *Commun. Inst. for. Fenn.* 40 (6), 1952. pp. 17. [Fi.e.]

814. **Japanese lumber exports.** *Timb. Tr. J.* Ann. spec. issue, 1954 (132–5).

Includes figures for exports of lumber, manufactured flooring, plywoods and veneers and plywood chests and wooden boxes in shooks.

815. Swabey, C. **Forest productivity in Uganda.** *Tech. Note For. Dep. Uganda* No. 9/54, 1954. pp. 9.

Discusses the supply and present and future demand in fuel, poles, timber and other forest

products and makes recommendations for departmental work.

816. ROSEVEAR, D. R. **Are the Meliaceae of prime importance?** *Inform. Bull. For. Dep. Nigeria* No. 18, 1954. pp. 5.

Gives export statistics to show that secondaries (*Triplochiton*, *Mitragyna*, *Gossweilerodendron*, *Terminalia* spp.) have contributed in the period 1935–53 three times the volume of Meliaceae, which has recently fallen to 17·5% of the total. Regeneration policy should face the possibility of a rising internal demand obliterating exports, in which case, unless a cheap colourless preservative can be found, the requirement will be chiefly for the insect- and climate-resisting Meliaceae.

817. CRUIKSHANK, J. W. **1950 pulpwood production in the south.** *For. Surv. Release Stheast. For. Exp. Sta.* No. 43, 1954. pp. ii + 32 + 2 maps.

75. TRADE CUSTOMS AND USAGES

818. JAMES, N. D. G. **Agreements for the sale of timber.** *Quart. J. For.* 48 (3), 1954 (206–9). (*Repr.* from *Journal of the Royal Institution of Chartered Surveyors* 33 (10), 1954.)

Discusses points to be considered in drawing up such agreements.

819. ROTHÉ, P. L. Les contrats commerciaux en matière de bois tropicaux. **[Commercial agreements in connexion with tropical timbers.]** *Bois For. Trop.* No. 36, 1954 (40–6). [F.f.e.span.]

Following a brief historical account, the author emphasizes the importance of the exact wording of such agreements, particularly when they refer to international transactions. They should be unambiguous and mention every detail as to grade of timber, terms of delivery, and payment. The Association Technique Internationale des Bois Tropicaux has drawn up and adopted standard clauses suitable for insertion in standard agreements or special contracts. Most agreements concluded in the tropical timber trade are in terms of f.o.b. or c.i.f., and the author points out that the terms peculiar to these present special features owing to the difficulty of acceptance of the timbers before shipment and the necessity of part payment in cash to the exporters before their actual arrival at their final destination. *From author's summary.*

79. ECONOMICS OF THE WOOD INDUSTRIES

See also Nos. 1014, 1043, 1048.

820. STAMENKOVIĆ, B. Drvna industrija Jugoslavije u periodu između 1947 i 1953 godine. **[The Jugoslav timber industry in 1947–53.]** *Šumarstvo* 7 (4), 1954 (193–205). 7 refs. [Serb.e.g.]

Includes tables and graphs showing: outturn of different products in 1953; ratios of saw and veneer timber, pulpwood and tannin raw material; and production figures for sawmills, plywood and fibreboard manufactures, manufacture of wood articles, and chemical processing of wood.

8. FOREST PRODUCTS AND THEIR UTILIZATION

821. **Partial list of Government publications of interest to architects, builders, engineers, and retail lumbermen.** *Rep. U.S. For. Prod. Lab., Madison* No. *R*1081, 1954. pp. 18. P.R.

The titles are divided into sections: fungus defects in forest products; growth, structure and identification of wood; mechanical properties and structural uses of wood and wood products; glued wood construction; seasoning of wood; wood finishing; wood preservation, and miscellaneous.

822. **Defense Supply Management Handbook DSMA H7. Lumber and allied products.** Superintendent of Documents, U.S. Government Printing Office, Washington. 1953. pp. 219. Many refs. Price $1·00. P.R.

Includes sections on: lumber grades and sizes; strength of wood; wood preservation; seasoning, handling and storage; boxes and crates; end-use guides for grade selection, and a glossary.

823. **1953 supplement to book of ASTM standards including tentatives. Part 4.** American Society for Testing Materials, Philadelphia. 1953. pp. x + 162. P.R.

Includes the following standards and methods: D25—53T Round timber piles (tentative); D1101—53 Integrity of glue joints in laminated wood products for exterior service, test for; E119—53 Fire tests of building construction and materials; D390—53 Creosote; D391—53 Creosote/coal-tar solution; D1271—53T Copperized chromated zinc chloride (tentative); D1272—53T Pentachlorophenol (tentative); D1273—53T Copperized chromated zinc chloride (analysis) (tentative), and D1274—53T Pentachlorophenol (analysis) (tentative).

824. SIIMES, F. E. **Problems and results of wood technology research in Finland.** *Transl. Commonw. sci. industr. Res. Organ. Aust.* No. 2171, 1954. pp. 11 + 6 photos + 2 dgms. + 5 gphs. Transl. by H. E. Kijlstra from *Norsk Skogind.* 7 (6), 1953 (184–91). Limited distribution.

825. CHUDNOFF, M. **The utilization of home-grown *Eucalyptus* [*E. rostrata*] in Israel.** [*Docum.*] *4th Sess. FAO Jt. Subcomm. Medit. For. Probl.* No. *FAO/CEF/SCM/46-A*, 1954. pp. 5. [E.]

81. WOOD AND BARK: STRUCTURE AND PROPERTIES

810. *General Information on Woods*

See also Nos. 139, 188–90, 193, 327, 329.

826. Benamingen van houtsoorten. **[Names of wood species.]** *Netherlands Standard* No. 1015 (2nd ed.) 1951. pp. 61. [Du.] P.R.

Gives Dutch standard trade names, alternative trade names and botanical names of 200 hardwood and softwood timbers.

827. KOLOC [Editor]. Werkstoff-Kartei Koloc. Holz. **[The 'Koloc' card index of materials: Wood.]** Fachbuchverlag G.m.b.H., Leipzig. 1951. 38 cards. [G.] P.R.

A card index edited by Prof. Koloc (Institut für Normung und Typung an der Technischen Hochschule, Dresden). Contains so far cards for 37 timbers giving the following information: (1) name (German, Latin, Russian, English, French); (2) chemical composition (in %); (3) origin; (4) qualitative characteristics such as brittleness, elasticity, shrinkage, nailing, polishability, inflammability; (5) form in which available to trade; (6) usual condition at delivery (e.g. steamed, impregnated); (7) uses; (8) physical properties (shrinkage, thermal expansion, dielectric constant, hardness, velocity and absorption of sound, moisture content, density, fuel value, thermal conductivity, electrical resistance, specific heat, electrical breakdown, friction coefficient); (9) working properties; (10) resistance to climate, water, rot, chemicals; (11) mechanical properties; (12) kindred species; (13) stem structure; (14) grain; (15) main and subsidiary colour of heart- and sap-wood; (16) price (in relation to Ash = 100%) [in East Germany?]. The sources of information are indicated on the back. The 37 species so far covered are: *Acer pseudoplatanus, A. platanoides, Ochroma lagopus, Betula verrucosa, Pyrus communis, Lophira procera, Buxus sempervirens, Pseudotsuga taxifolia, Castanea sativa, Quercus robur, Q. sessiliflora, Alnus glutinosa, Fraxinus excelsior, Eucalyptus marginata, Picea abies, Hicoria ovata, Pinus sylvestris, P. cembra, P. strobus, Larix decidua, Tilia cordata* (and *T. grandifolia*), *Swietenia mahagoni, Juglans regia, J. nigra, Aucoumea klaineana, Populus 'canadensis', P. nigra, P. tremula, Guaiacum officinale, Robinia pseudoacacia, Aesculus hippocastanum, Fagus sylvatica, Ulmus campestris* (with *U. effusa* and *U. montana*), *Abies alba, Tectona grandis, Salix alba,* and *Carpinus betulus.*

828. **Specimen woods Nos. 223–5.** *Suppls.* to *Wood* 19 (7–9), 1954. Each pp. 2.

Rimu (*Dacrydium cupressinum*); Serrette (*Byrsonima spicata*); and 'Rhodesian Teak' (*Baikiaea plurijuga*).

829. **[Japanese woods.]** *Suppls.* to *Wood Ind., Tokyo* 9 (8; 9), 1954. Each pp. 2. [Jap.] P.R.

Photomicrographs and tabulated data on properties of *Thujopsis dolabrata* and *Larix leptolepis.*

830. FERREIRINHA, M. P. Notas sobre as madeiras do Ultramar, 2ª Série. **[Notes on overseas species. Series 2.]** *Estud. Inform. Serv. flor. aqüic Portugal* No. 34-*D*3, 1954. pp. 11 + 3 plates. 6 refs. [Port.] Limited distribution.

Further timbers of Angola and Mozambique: *Terminalia superba, Adina microcephala, Erythrophleum africanum, E. guineense, Afzelia quanzensis* and *Oxystigma oxyphyllum.*

831. **Trees and timbers of Sarawak and Brunei.** *Leafl. For. Dep. Sarawak* Nos. 36–42, [1954].

(36) *Barringtonia* spp. (including fish poison), *Lagerstroemia* spp., *Sonneratia caseolaris, S. alba* (pp. 6).

(37) *Aquilaria* spp. and *Gonystylus bancanus* (including notes on distribution and abundance, preservative treatment, and seasoning) (pp. 8).

(38) Notes on the species (of several genera) known as Medang, particularly several species of *Cinnamomum* (*C. parthenoxylon, C. iners,* and others not identified) and *Litsea* (pp. 5).

(39) Silvicultural characters and minor products of *Nipa fruticans, Oncosperma filamentosa, Calamus* spp., *Arenga* spp. and other Palmaceae (pp. 8).

(40) Silvicultural characters and wood properties of *Eugenia* sp., *Melaleuca leucadendron* (including bark and oil), *Tristania* spp., and *Whiteodendron moultonianum* (pp. 7).

(41) Silvicultural characters and wood properties of *Adinandra dumosa, Ploiarium alternifolium* and *P. pulcherrimum* (pp. 3).

(42) Silvicultural characters, wood properties and tanstuffs of *Rhizophora conjugata* and *R. mucronata,* five species of *Bruguiera, Ceriops tagal* and *C. roxburghiana* (pp. 8).

832. KEYLWERTH, R. Das Holz von *Sequoia gigantea.* **[The wood of *S. gigantea.*]** *Holz Roh- u. Werkstoff* 12 (3), 1954 (105–7). 3 refs. [G.]

Tabulates, lists and illustrates the anatomical structure, and physical and mechanical properties of *S. gigantea,* determined from 5 sections of stems 26·6 m. long, grown in Germany (Heidelberg). Figures for Douglas Fir and Spruce are also listed for comparison.

833. KRYN, J. M. **Information leaflet. Foreign woods. Quebracho, Quebracho colorado, Quebracho macho. *Schinopsis lorentzii* Engl. and *Schinopsis balansae* Engl.** *Rep. U.S. For. Prod. Lab., Madison* No. 1969, 1954. pp. 10. 33 refs. P.R.

834. KEYLWERTH, R. Virola. **[*Dialyanthera otoba* Warb.]** *Holz Roh- u. Werkstoff* 12 (3), 1954 (113–4). 4 refs. [G.] P.R.

835. NARAYANAMURTI, D., and JAIN, N. C. **Short note on Indian Balsa.** *Indian For.* 80 (6), 1954 (338–41). 5 refs.

A study was made of 3 logs of Balsa grown in Madras (girth 45 in.) and test results are tabulated for density, tensile strength, modulus of rupture, compressive and shear strength. Notes are also given on thermal conductivity, gluing properties and chemical analysis.

836. KRYN, J. M. **Information leaflet. Foreign woods. Odoko. *Scottellia coriacea* A. Chev.** *Rep. U.S. For. Prod. Lab., Madison* No. 1973, 1954. pp. 5 + 1 tbl. 11 refs. P.R.

837. GERRY, E., and KRYN, J. M. **Information leaflet. Foreign woods. Manbarklak. *Eschweilera longipes* (Poit.) Miers. *Eschweilera subglandulosa* (Steud.) Miers.** *Rep. U.S. For. Prod. Lab., Madison* No. 1960, 1953. pp. 7 + 2 tbls. 20 refs. P.R.

838. GRIFFIOEN, K. *Albizzia falcata* Backer, een goede industrie-houtsoort. **[*A. falcata,* a useful industrial timber species.]** *Bergcultures, Djakarta* 23 (6), 1954 (139 . . . 147). [Du.e.] I.M.I.

Distribution, silvicultural characters and pests of the tree are briefly described, and particulars are given of the physical properties, preservation and durability, and technical properties for structural timber, cases, veneer and plywood, matches, shingles and building boards. Because of its durability and wide range of uses increased planting is recommended.

839. KRYN, J. M. **Information leaflet. Foreign woods. Toon, Burma Cedar, Moulmein Cedar, Thitkado, *Cedrela toona* Roxb.; *Cedrela serrata* Royle, and Australian Red Cedar, *Cedrela toona* Roxb. var. *australis* C. DC.** *Rep. U.S. For. Prod. Lab., Madison* No. 1970, 1954. pp. 9 + 4 tbls. 30 refs. P.R.

840. KRYN, J. M. **Information leaflet. Foreign woods. Degame, Lemonwood. *Calycophyllum candidissimum* (Vahl.) DC.** *Rep. U.S. For. Prod. Lab., Madison* No. *R*1949, 1953. pp. 7. 28 refs. P.R.

841. Mukulungu. [***Autranella congolensis.***] *Bois For. Trop.* No. 36, 1954 (25–8). [F.]

Botanical and silvicultural characters and wood properties.

842. KRYN, J. M. **Information leaflet. Foreign woods. Simarouba, Paradise-tree, Marupa. *Simarouba* spp.** *Rep. U.S. For. Prod. Lab., Madison* No. 1956, 1953. pp. 7 + 2 tbls. 28 refs. P.R.

843. GERRY, E., and MILLER, C. M. **Information leaflet. Foreign woods. Obeche, Ayous, Samba, African Whitewood. *Triplochiton scleroxylon* K. Schum.** *Rep. U.S. For. Prod. Lab., Madison* No. 1974, 1954. pp. 13 + 1 tbl. 50 refs. P.R.

811. *Structure, Identification*

See also Nos. 255, 945.

844. METCALFE, C. R. **Recent advances in taxonomy as seen by an anatomist.** [*Pap.*] 8*th int. Bot. Congr., Paris, Sect. 4* 1954 (37–43). X.

845. LEROY, L.-F. Anatomie et classification chez les phanérogames. **[Anatomy and classification in the phanerogams.]** [*Pap.*] 8*th int. Bot. Congr., Paris, Sect. 4* 1954 (44–5). [F.] X.

Cites some outstanding examples where anatomical evidence has thrown light upon taxonomic problems.

846. **Morphology. Session 10A: various papers.** *Proc. 7th int. bot. Congr., Stockholm 1950*, 1953 (382–5). [E., F. or G.]

Includes papers (with discussion) by: *P. Greguss* on the wood anatomy of conifers [cf. *For. Abstr.* 12 (Nos. 1149, 2980)]; and *P. Champagnat* on the determination of priorities in development of buds on 1-year woody shoots of Lilac.

847. CHOWDHURY, K. A. **Dicotyledonous fossil woods: convergent wood structure.** [*Pap.*] 8*th int. bot. Congr., Paris, Sect. 13A* 1954. pp. 8. X.

Reviews the subject of the taxonomic classification of woody plants in relation to wood structure, and discusses the application of the principles so far arrived at to the identification and classification of fossil woods.

848. HOFMANN, E. Fossile Hölzer und deren Baupläne. **[Fossil woods and their structure.]** [*Pap.*] 8*th int. bot. Congr., Paris, Sect. 5* 1954 (234–6). [G.f.] X.

Cites examples of fossil woods showing a convergent arrangement of tissues in cross-section.

849. NORMAND, D., and CHÂTELET, R. Exemples de plans ligneux actuels apparement convergents. **[Examples of apparently convergent wood structure in existing plants.]** [*Pap.*] 8*th int. bot. Congr., Paris, Sect. 13A* 1954. pp. 6. X.

Discusses 4 cases of apparent convergence: (1) *Bombax* and *Ceiba*, (2) *Albizzia* and *Maesopsis*, (3) *Hernandia* and *Semecarpus*, and (4) *Loesnera* and *Majidea*, and concludes that the convergence is more apparent than real, and that microscopic examination reveals distinctions of structure.

850. KAEISER, M. **Microstructure of the wood of *Juniperus*.** *Bot. Gaz.* 115 (2), 1953 (155–62). 17 refs. O.B.D.

Presents data on a large number of species classified into the 3 groups of Endlicher. In spite of the marked similarity of the woods, the data support the separation of the genus into at least 2 groups. In Sections I and II there is agreement in the most frequent number of cross-field pits and in the greater tendency for the occurrence of taxodioid type of cross-field pitting. In Section III the most frequent number of cross-field pits is lower, and the taxodioid pits are either of rare occurrence or lacking. *From author's summary.*

851. MULAY, B. N., and GANGADHARAN. **A study on the structure of vascular bundles and secondary growth in the stem of some *Dracaena* species.** [*Pap.*] 8*th int. bot. Congr., Paris, Sect. 8* 1954 (307–9). X.

852. JOHNSTON, D. R. **Structure drawings to 'Specimen Woods', Sheets 37–9.** *Wood* 19 (7–9), 1954 (294; 332; 370).

(37) Ranai (*Alseodaphne semecarpifolia*), Krabak (*Anisoptera* spp.), Nedun (*Pericopsis mooniana*), and Katora (*Sandoricum indicum*).

(38) Kokrodua (*Afrormosia elata*), Ogea (*Daniella ogea*), Chilean Laurel (*Laurelia aromatica*) and Albizzia (*A. ferruginea*).

(39) Maho (*Sterculia pruriens*), Strawberry Tree (*Arbutus unedo*), Antiaris (*A. africana*) and Agalai (*Chikrassia velutina*).

853. PENNINGTON, M. T. **A comparative study of wood anatomy of fifty-four species of the family Aquifoliaceae.** *Abstr. of thesis*, in *Dissert. Abstr.* 14 (7), 1954 (1019–20). [University of Virginia.] O.R.S.

The family was found to be a natural one from the point of view of wood anatomy, and well defined. The only aberrant genus is *Sphenostemon*, which differs from the others especially in the character of the vessels.

854. STARK, E. W. **Wood anatomy of the Betulaceae indigenous to the United States.** *Sta. Bull. Ind. agric. Exp. Sta.* No. 602, 1953. pp. 31. 53 refs.

Includes keys and photomicrographs for the identification of 7 species of *Betula*, 6 of *Alnus*, 1 of *Carpinus*, 3 of *Ostrya* and 2 of *Corylus*.

855. LEMESLE, R. Les caractères histologiques du bois secondaire des Magnoliales. **[Histology of the secondary xylem of the Magnoliales.]** *Phytomorphology* 3 (4), 1953 (430–46). 46 refs. [F.] O.B.D.

811.1. Anatomical Elements and Tissues

See also Nos. 127–8, 400, 467, 883, 891–2, 946, 1185.

856. LIESE, W., and HARTMANN-FAHNENBROCK, M. **Electron-microscope investigations of the bordered pits of conifers.** *Transl. Commonw. sci. industr. Res. Organ. Aust.* No. 2220, 1954. pp. 5 + 9 photos + 1 drawing. Transl. by M. Slade from *Biochimica et Biophysica Acta, Amsterdam* 11 (2), 1953 (190–8). [See *For. Abstr.* 15 (No. 1735).] Limited distribution.

857. HARADA, H. **[Electron-microscopic investigation on the pits of Buna (*Fagus crenata*) and Nara (*Quercus crispula*).]** *Wood Ind., Tokyo* 9 (8), 1954 (375–9). 9 refs. [Jap.e.] P.R.

The electron micrographs [with English legends] of pits of the air-seasoned wood showed that the pit membrane of bordered, half-bordered and simple pit pairs has a simple membrane structure and that its surface is flat with a reticulate fibrillar structure. *From author's summary.*

858. RIBI, E. **Electron microscopic investigations of the cell wall organization of wood.** *Experimental Cell Research, New York* 5 (1), 1953 (161–72). 24 refs. L.S.

Presents a series of electron micrographs of sections of wood of *Ochroma lagopus* and *Populus tremuloides* and comments on the organization of cellulose fibrils in the cell walls.

859. EMERTON, H. W., and WATTS, J. **Examination of Spruce tracheids under polarized vertical illumination.** *Proceedings of the Technical Section, British Paper and Board Makers' Association (Inc.), Kenley* 34 (1), 1953 (269–87). 10 refs. L.S.

Good differentiation was obtained between the primary and secondary cell walls in unbeaten bleached sulphite Spruce tracheids by means of vertical illumination (i.e. illumination falling on the specimen from the viewer's side) and, in particular, with vertical polarized light. The primary wall shows bright under crossed polars, whereas the secondary wall remains dark. The method has the great merit that no spurious effects can be introduced in the preparation of the specimen other than those brought about by drying the fibre. The effects observed in Spruce tracheids are described and discussed. The technique appears to open up a wide field for further study.

860. WARDROP, A. B. **The fine structure of the conifer tracheid.** *Holzforschung, Berlin* 8 (1), 1954 (12–29). 113 refs. [E.e.g.] P.R.

Reviews some aspects of the chemical and physical nature of the cell wall in conifer tracheids. This includes a discussion of the chemical constituents and the nature of their physical aggregation with reference to the significance of the microfibrils revealed by electron microscopy and the micelles deduced from X-ray studies. New data on the degree of lateral order in different celluloses are presented. Evidence that the microfibrils represent supermicellar units is considered inconclusive because of the established variation in the size of microfibrils in different celluloses and the variation in lateral order revealed by X-ray examination of similar material. The cell-wall organization of the conifer tracheid is discussed with reference to the orientation of the micellar strands in the primary wall and the 3 layers of the secondary wall as revealed by the techniques of optical microscopy, polarization optics, X-ray diffraction and electron microscopy. Evidence for the existence of a crossed fibrillar structure in the several layers of the secondary wall is presented. It is considered possible that such a structure is present in the outer layer of the secondary wall, but this is improbable in the middle layer. The swelling behaviour of delignified conifer tracheids before and after acid hydrolysis is described and the possible influence of orientation of the micellar strands in the different layers of the secondary cell wall upon this process is discussed. The suggestion that the transverse fissures arising upon swelling of acid-hydrolysed fibres represent intrinsic transversely oriented structures in the cell wall is rejected. It is suggested that these fissures arise in the region of cell-wall deformities which are susceptible to acid hydrolysis. Electron micrographs give no evidence of any pre-existent transverse structures. The relation of these studies to chemical evidence for the existence of acid-susceptible linkages in cellulose molecules is indicated briefly. *Author's summary.*

861. PHILLIPS, E. W. J. **Influence of leaf activity on the composition of wood cell wall.** *Nature, Lond.* 174 (4419), 1954 (85–6). 3 refs. [Forest Products Research Laboratory, Princes Risborough.]

Evidence has recently been found that the controlling factor in lignification (in the botanical sense) of the fibre walls is the illumination received by the leaves. The hypothesis originated during a survey of the variation in lignification of English Ash, when it was noticed that the early-wood zone of each annual ring consistently gave a poor lignin reaction, irrespective of the degree of lignification in the remainder of the ring. Confirmatory evidence for this hypothesis was obtained from a pilot experiment. A hood was placed over the upper portion of coppice shoot of Ash early in May 1953, shortly after the buds had burst and the leaves were no more than 2 in. long. A fortnight later, the hood was removed and the etiolated leaves exposed to normal illumination for a month. The hood was then replaced for another 3 weeks, and finally removed in mid-July. Examination of transverse sections of this shoot showed that the 1953 growth-ring in the hooded portion of the stem contained alternate zones of unlignified and lignified fibres corresponding respectively with the alternating periods of hooding and exposure of the leaves to light. A control stem growing from the same stool showed the usual pattern of lignin reactions. In view of these

observations, it seems reasonable to attribute the greater lignification of tropical timbers to the exposure of the tree crowns to more adequate solar illumination.

862. Traynard, P., and Ayroud, A.-M. Étude de la cellule végétale de bois de peuplier au moyen de la chloration. **[Investigation of the Poplar wood cell by means of chlorination.]** *Bulletin, Association Technique de l'Industrie Papetière, Paris* 1953 (6), (153–63). 36 refs. [F.f.] P.A.T.R.A.

[Cf. *For. Abstr.* 15 (No. 679).] The Cl absorption as a function of time and Cl concentration, and the rate of Cl absorption as a function of time, are plotted for the reactions between Poplar sawdust dried by infra-red heating and anhydrous solutions of Cl in CCl_4, the system being kept homogeneous by stirring, and exposed to diffuse light. For the Cl concentration range 30–90 g./litre of solution, the amount of Cl absorbed varies as the initial Cl concentration; the weights of the ethanol extract and soda-solution extract after Cl absorption increase as the period of absorption increases; the proportion of HCl formed to Cl_2 supplied is high for small Cl concentrations and short duration of reaction, but decreases rapidly as the Cl concentration rises and the time of reaction becomes longer. A detailed analysis of the total absorption of Cl and its rate, reveals that the absorption takes place in 3 stages, the first and second of which end when the absorption rate falls to zero. The corresponding absorption graph shows two flat portions on the curve, which are absent in curves for reactions in the presence of HCl-absorbing substances, such as pyridine or Na acetate. The authors believe that the presence of flat portions in the Cl-absorption curve can be explained by the distribution of lignin (which is responsible for the formation of HCl when reacting with Cl_2) in the form of several layers separated by substances which do not react easily with Cl_2.

In order to investigate the micro-structure of the cell wall, the authors prepared 50-μ-thick sections of Poplar wood, which were treated with Cl in a CCl_4 solution, freed from Cl by drying, extracted with ethanol at 95° C., treated for 1 hour with a 1% Na_2CO_3 solution at 40° C., washed with distilled water, and examined under a microscope in polarized light. The duration of the Cl treatment was 1–2, 4–7½, 20½, and 96 hours, and both longitudinal and transverse sections were examined. The photomicrographs presented show that it is the middle lamella that disappears in the first place (during the first reaction stage); this is followed by further loosening of the structure, with simultaneous appearance of 3 cellulose layers. A structural model of lignin distribution in the middle lamella and secondary wall is proposed, comprising 3 concentric (annular) layers of lignin-rich material with 3 (two intermediate and one innermost) layers of cellulosic material poor in lignin. Similar procedure applied to other species revealed only one lignin layer in the cell wall of Sweet Chestnut and Silver Fir, and 4 lignin layers in that of Beech. In Fir, the result may be affected by the great difference between the early- and late-wood tracheids.

863. Traynard, P., Ayroud, A. M., Eymery, A., Robert, A., and Coligny, S. de. Répartition de la lignine dans la paroi secondaire chez certains végétaux. **[Distribution of lignin in the secondary cell wall of some plants.]** *Holzforschung, Berlin* 8 (2) 1954 (42–6). 6 refs. [F.f.g.] P.R.

Sections of wood of Poplar, Chestnut, Beech, Spruce, Balsa (*Bania excelsa*) [*sic*], *Scytopetalum latifolium*, *Coula edulis*, *Diospyros* sp., and *Ginkgo biloba* were subjected to such chemical agents as: Cl in CCl_4, HNO_3 in acetic acid, chromic mixture, and hydrotropic solvents. It was found that it was always lignin that was attacked. The presence of several dark zones in the specimens examined is explained by the disappearance of lignin from the secondary wall, on the thickness of which their number depends.

864. Asunmaa, S., and Lange, P. W. **The distribution of 'cellulose' and 'hemicellulose' in the cell wall of Spruce, Birch and cotton.** *Svensk PappTidn.* 57 (14), 1954 (501–16). 12 refs. [E.e.g.] P.R.

The distribution of material in various fibres derived from Spruce and Birch holocellulose and cotton was measured by microspectrographic methods, the fibres having been esterified with *p*-phenylazobenzoyl chloride [cf. *For. Abstr.* 14 (No. 3752)]. Holocellulose is fairly evenly distributed in Spruce and Birch, with perhaps a tendency to increasing amounts of carbohydrate material towards the outer region of the cell wall in Birch. Cellulose is most densely packed round the lumen, with the relative packing-density in the outermost layers roughly half that round the lumen. Hemicellulose makes up 50% or more of the carbohydrate material in the outer regions of the cell wall, and 10–20% of that round the lumen. In cotton, cellulose is fairly evenly distributed across the cell wall, with a small amount of 'accessible' material deposited mainly in the outer regions. Results are shown in transmission curves and graphs.

865. Asunmaa, S., and Lange, P. W. **A note on the changes in cell wall dimensions of carbohydrate fibres after esterification with *p*-phenylazobenzoyl chloride and subsequent swelling in pyridine.** *Svensk PappTidn.* 57 (14), 1954 (498–500). 2 refs. [E.e.g.] P.R.

Part VI of 'The distribution of the components in the plant cell wall'. [Cf. *For. Abstr.* 14 (No. 3752).]

866. Lange, P. W. **The distribution of lignin in the cell wall of normal and reaction wood from Spruce and a few hardwoods.** *Svensk PappTidn.* 57 (15), 1954 (525–35). 8 refs. [E.e.g.] (Part IX of The distribution of the components in the plant cell wall.) P.R.

Lignin distribution was studied by microspectrographic methods in the ultraviolet range. Results, shown in transmission curves and photomicrographs, indicate that lignin is mainly deposited in the compound middle lamella. In Spruce, the concentration round the lumen is 15–25% of that in the middle lamella. For the hardwoods examined (Ash, Aspen, Beech, Birch and Elm) the lignin concentration in the secondary cell wall was less than that of Spruce. The secondary cell walls of

compression wood of Spruce and tension wood of Beech contained very little lignin.

867. LANGE, P. W. **Mass distribution in the cell walls of Swedish Spruce and Birch.** *Svensk PappTidn.* 57 (15), 1954 (533–7). 15 refs. [E.e.g.] (Part X of The distribution of the components in the plant cell wall.) P.R.

The X-ray absorptions of the secondary wall and the compound middle lamella were measured on cross-sections of Spruce and Birch by microradiographic methods. From these measurements the ratio of the dry-weight masses per volume unit in the two cell-wall regions was determined and compared with the calculated densities. The compound middle lamella was found to have a more porous structure than the secondary wall.

868. LANGE, P. W. **The distribution of the components in the plant cell wall. Review of earlier work and future possibilities.** *Svensk PappTidn.* 57 (16,) 1954 (563–7). 39 refs. [E.e.g.] (Part XI of The distribution of the components in the plant cell wall.) P.R.

Summarizes the main results (from American and European literature and research) obtained in micro-optical investigations on the distribution of carbohydrates and lignin in the cell wall, especially of *Picea abies*.

869. IABLOKOFF, A. K. Variation de la forme, des dimensions et de la structure des parois des trachéides de l'épicéa (*Picea excelsa* Link) en fonction de l'accroissement annuel. **[Variation in form, dimensions and cell-wall structure of tracheids of *P. abies* in relation to the annual increment.]** *C. R. Acad. Sci., Paris* 238 (19), 1954 (1906–8). 1 ref. [F.f.] O.R.S.

A histological study of transverse sections showed that variations in the radial and tangential dimensions of tracheids increase, their cross-section tends to become hexagonal rather than rectangular, and there are increasing modifications in cell-wall structure, with increasing annual increment (as shown by annual-ring breadth). Relationships are shown in graphs.

870. BANNAN, M. W. **Ring width, tracheid size, and ray volume in stem wood of *Thuja occidentalis*.** *Canad. J. Bot.* 32 (3), 1954 (466–79). 35 refs. O.R.S.

Circumstances favouring accelerated growth, as shown in more frequent periclinal divisions in the cambium, encouraged earlier pseudotransverse division of fusiform initials and the production of shorter tracheids. Among trees of similar size, decline in growth rate was accompanied by lengthening of cambial cells, with a maximum associated with annual increments of 0·7–0·8 mm. Mean tracheid length in late wood exceeded that of early wood in the same or succeeding growth ring, and difference in lengths in early and late wood was greater for wood with wide rings. Tracheid diameter was only slightly influenced by rate of growth. A positive correlation existed between ray volume and rate of growth.

871. WILSON, J. W. **Fibre technology—I. Fibre length mensuration: a comparative history and new method. II. A critical survey of laboratory wood maceration techniques.** *Pulp Paper Mag. Can.* 55 (5;7), 1954 (84–91; 127–9). 149 and 55 refs. (*Res. Pap. Fac. For. Univ. B.C.* Nos. 4, 7.)

I. The new method consists of microscopic projection of the fibre on to a suitably graduated circular target. It is known as the 'graduated bull's eye target method'.

II. Existing methods, none completely satisfactory, are discussed. Research to develop new methods has been started at the University of British Columbia. Active oxygen (peroxygen) chemicals, both inorganic and organic, offer possibilities.

872. KENNEDY, R. W., and WILSON, J. W. **Studies on smooth and cork-bark *Abies lasiocarpa*. I. Fibre length comparisons.** *Pulp Paper Mag. Can.* 55 (7), 1954 (130–2). 3 refs. (*Res. Pap. Fac. For. Univ. B.C.* No. 6.)

[Cf. *For. Abstr.* 15 (No. 898).] Fibre length was measured by the 'graduated bull's-eye target method' [see preceding abstract]. Results showed that (1) fibres from the wood of the smooth-bark (*s*) are significantly longer than those of cork-bark (*c*) trees at comparable ages; (2) within equivalent age increments of *s* trees, fibre length is significantly greater in trees with faster growth; (3) because of slower growth rate, *c* trees have longer fibres up to a d.b.h. of 4 in. u.b., after which the *s* trees have longer fibres; (4) fibres from *c* trees reach a maximum length between the 65th and 115th annual increment but those of *s* trees do not reach a maximum during the first 110 years. As a result fibre-length/age and fibre-length/tree-diameter relationships between the two types show greater divergence at higher ages and diameters.

873. WEBER, F. **Stone tyloses.** *Transl. Commonw. sci. industr. Res. Organ. Aust.* No. 2226, 1954. pp. 3 + 4 drawings. Transl. by U. von Koeppen from *Phyton, Annales Rei Botanicae, Horn, N.-Ö.* 3 (1/2), 1951 (104–7). Limited distribution.

Stone tyloses were found round the larval chambers of *Saperda populnea* in *Populus tremula* and in vessels of part of a stem of *Bauhinia* sp.

811.2. Special Features and Abnormal Structure

See also Nos. 128, 492, 866.

874. LEROUX, R. Recherches sur les modifications anatomiques de trois espèces d'osiers (*Salix viminalis* L., *Salix purpurea* L., *Salix fragilis* L.) provoquées par l'acide naphtalène-acétique. **[Research on anatomical modifications in *S. viminalis*, *S. purpurea*, and *S. fragilis* caused by naphthaleneacetic acid.]** *Comptes Rendus des Séances de la Société de Biologie et de ses Filiales, Paris* 148 (3/4), 1954 (284–6). [F.] O.R.S.

The main changes, similar for all 3 species, are initiation of a corky zone; hypertrophy of the cortex and phloem parenchyma cells; reduction in the vascular zone, with little differentiation taking place in it; and inhibition of differentiation in the pericyclic fibres.

875. STERN, W. L. **A suggested classification for intercellular spaces.** *Bull. Torrey bot. Cl.* 81 (3), 1954 (234–5). 5 refs. O.B.D.

The following tentative outline of a classification is suggested: A. Non-secretory (interstitial) intercellular spaces. B. Secretory intercellular spaces: I. Intercellular cavities, (*a*) gum cavity, (*b*) resin cavity; II. Intercellular canals, (*a*) gum canal (duct), (*b*) resin canal (duct).

811.4. Growth Rings. Early and Late Wood

See Nos. 906, 946–7.

811.5. Sapwood and Heartwood

See also Nos. 943, 948.

876. KOLLMANN, F. Über die physikalische und technologische Bedeutung der Kernstoffe des Holzes. **[The physical and technological importance of heartwood substances.]** [*Pre-issue*] *Proc. Congr. int. Union For. Res. Organ., Rome 1953* Section 41 (No. 3), 1953. pp. 6 + 4 gphs. 27 refs. [G.] Limited distribution.

Summarizes and discusses existing knowledge on heartwood formation, and on its chemical, physical and technological properties.

877. HARRIS, J. M. **Heartwood formation in *Pinus radiata*.** *Tech. Pap. N.Z. For. Serv.* No. 1, 1954. pp. 31. 9 refs.

The heartwood of *P. radiata* is anatomically differentiated from sapwood in being that part of the xylem in which all cells have lost their living contents. Throughout the xylem, from the cambium to the outer margin of the coloured heartwood, both resin-canal sheaths and wood rays contain nucleate cells. The seasonal period of heartwood formation varies considerably, but apparently commences with a concentration of resins in a narrow zone surrounding the coloured heartwood during the months of July to October. During November and December the resins undergo chemical and physical changes which result in the production of additional coloured heartwood. Dominant trees contain a statistically significant lower % of heartwood than suppressed trees. It can be shown that the nature of the growing site has a statistically significant effect on the rate of heartwood formation. However, site quality (as determined by its effects on height growth) cannot be directly related to the heartwood content of the trees.

Dominant trees have a higher heartwood resin content than suppressed trees. It could not be shown that variations in growing site had any influence on the resin content of the heartwood. Factors conducive to heartwood production are those which reduce the incidences of physiological drought, and may be listed in order of importance: (*a*) a soil which permits the development of a deep root system, (*b*) a well-distributed and adequate rainfall, (*c*) absence of drying winds or of conditions of low humidity. *Author's summary.*

878. LAPPI-SEPPÄLÄ, M. Männyn sydänpuusta ja runkomuodosta. **[Heartwood formation and stem form of Scots Pine.]** *Commun. Inst. for. Fenn.* 40 (25), 1952. pp. 26. 37 refs. [Fi.g.]

The author's studies on Pine heartwood have led to the following conclusions. Heartwood forms at 30–40 years and its ratio increases with age, depending on the crown quality of the tree and its position in the stand. The effect of site quality on heartwood formation is slight and difficult to determine. The heartwood/basal-area ratio is greatest at 0·2 or 0·3 of total stem height. The bending strength of heartwood of growing Pine is much higher than that of the sapwood. The biological function of heartwood is discussed in theoretical terms.

879. PACLT, J. Zjadernění a typologie nepravého j ádra u buku. **[Heartwood formation and types of false heartwood in Beech.]** *Repr.* from *Preslia, Praha* 25, 1953 (211–20 + 6 photos). 11 refs. [Cz.russ.e.] P.R.

[Cf. *For. Abstr.* 14 (No. 3699).] Original drawings and photographs indicate the existence of false heart in the root system of *Fagus* sp. The wounds in the foci of heartwood formation are essentially of two types: (1) central wounds, giving rise to ovoid heart, and (2) peripheral wounds giving rise to star-shaped heart. Another criterion is the time factor: (*a*) simultaneous [almost instantaneous?] and (*b*) successive heartwood formation, the former producing the simple and the latter the complex heartwood types.

811.6. Texture. Grain. Figure

See also Nos. 115–6.

880. JAY, B. A. **Grain in timber.** *Wood* 19 (6; 7), 1954 (233–7; 282–6).

Defines grain, describes with illustrations various grain defects and discusses methods of measuring slope of grain and the effect of grain defects on movement of moisture, and appearance, workability and strength of timber.

881. RUDEN, T. Om valbjørk og endel andre unormale veddannelser hos bjørk. **['Brown curly Birch' and some other abnormal wood formations in Birch.]** *Medd. norske Skogforsøksv.* 12 (3) (No. 43), 1954 (451–505). 15 refs. [Nor.nor.e.]

Concludes from the examination of Birch in S. Norway that Birch containing a brown figure (illustrated) is a distinct variety for which the name *B. verrucosa* f. *maserica* is proposed. The variety is distinguished by its wood structure from other figured Birch (e.g. that from burls or from wood marked by the larvae of *Dendromyza betulae*). The formation of this figure is attributed to genetic peculiarities in bark growth. Instead of being distributed evenly it begins in small spots and continues in narrow belts in all directions from the initial points. The heavy growth in these areas tears small wounds in the wood cambium, which are later healed by callus formation. Illustrations have English legends.

812. *Physical and Mechanical Properties*

See also Nos. 359, 946.

882. SILVESTER, F. D. **A conditioning cabinet for small test specimens.** *Wood* 19 (9), 1954 (360–2). [Timber Development Association, London.]

The cabinet, designed to raise or lower the moisture content of small clear specimens of timber to 12% as rapidly as possible without causing degrade, has a heating element consisting of a 130-watt carbon filament lamp, thermostatically controlled and an

external water tank as humidifier controlled by a humidistat. An electric fan provides air circulation. Temperature control is within ± 1° F. and humidity control within ± 3%. The cabinet, built for less than £100, is illustrated by photographs and plans.

883. LENZ, O. Le bois de quelques peupliers de culture en Suisse. **[The wood of some Poplars grown in Switzerland.]** *Mitt. schweiz. Anst. forstl. Versuchsw.* 30, 1954 (1–61 + 4 plates). 86 refs. [F.f.g.]

A study was made of the wood of two trees each of the following: (1) a variety of × *P. regenerata* from Fort (in the Rhone delta) known as 'Sarcé rouge', (2) a variety of × *P. serotina* from Fort, known as 'Raverdeau blanc', (3) an unidentified Poplar widely grown in the Neuchâtel region and known as 'd'Yvonand', (4) × *P. serotina* from Yvonand, (5) *P. 'virginiana'* from Yvonand, and (6) one tree of × *P. regenerata* (a different strain) from Fort. Highest m.a.i. was found in (3), that of (1) and (2) was about the same, but inferior to (3), that of (4) was lowest. The green density of Poplar wood averages ca. 840 kg./cu.m. Oven-dry density in any given zone is specific for the variety; the lightest wood is formed by (3) and (5), followed in descending order by (6), (1), (4) and (2). M.c. in stemwood of Poplar in the green state is fairly constant, averaging 480 litres/cu.m. Shrinkage of Poplar wood from the green to the oven-dry state increases with density; it averages 11·6% for (3), 12% for (5), 13·6% for (1), 13·8% for (4), and 14·8% for (2) (shrinkage expressed in % of green volume). Study of the microstructure showed that differences in density were chiefly due to fibre dimensions. The mean diameter of the lumen of fibres in the stemwood of (3) is 28·7 μ compared with 18 μ for (2), and corresponding thickness of the cell wall respectively 2·9 μ and 3·6 μ.

884. **[Physical and mechanical properties of *Shorea albida*.]** *Rep. For. Dep. Sarawak 1951*, 1954 (14).

812.1. Optical, Acoustic, Frictional, Thermal and Electrical Properties

See also Nos. 909–10.

885. MARKWARDT, L. J., BRUCE, H. D., and FREAS, A. D. **Brief descriptions of some fire-test methods used for wood and wood-base materials.** *Rep. U.S. For. Prod. Lab., Madison* No. 1976, 1954. pp. 21. 27 refs. P.R.

Comparative description of various American and British methods and tests for determining ignitability, spread, and penetration of fire; some of the methods are recommended in the summary.

886. **The specific heat of wood.** *Rep. For. Prod. Res. Bd., Lond. 1953*, 1954 (46–8).

Specific heat of Beech sawdust containing moisture was calculated from the formula

$$S_u = \frac{S_o + u}{1 + u}$$

where S_o is the specific heat of the dry wood and u the moisture content (g. water/g. dry wood), and was measured experimentally. The observed results lay well above the calculated ones. Results for Oak show a similar trend. Some possible explanations are discussed.

812.2. Behaviour with Liquids and Gases. Moisture Relations etc.

See also Nos. 880, 903–4, 944, 1170.

887. **Testing timber for moisture content.** *Trade Circ. For. Prod. Aust.* No. 50, 1954. pp. 20. (Supersedes *Trade Circ.* No. 45, 1939.)

An account of different methods of testing, with a table of corrected moisture contents for electrical-resistance moisture meters calibrated for Douglas Fir, when testing different, mainly Australian, timbers.

888. KÜHNE, H., and STRÄSSLER, H. Über die Bestimmung der Holzfeuchtigkeit. **[Determination of the moisture content of wood.]** *Schweizer Archiv für angewandte Wissenschaft und Technik, Solothurn* 18 (8), 1952 (264–75). 48 refs. [G.g.e.] P.O.

Different methods of determining moisture content are surveyed, with particular reference to the results of tests and practical exprience with moisture meters under workshop conditions. (*a*) *Oven method*: very accurate, except for woods with much volatile matter other than water; suitable for any m.c.; sampling causes loss of water; long time required for determination. (*b*) *Hair hygrometers and Co-salt hygrometers*: low degree of accuracy; m.c. only up to fibre-saturation point; considerable depth of material required; time required 15–30 min.; low costs. (*c*) *Electrical resistance*: accuracy sufficient for most purposes, unless moisture distribution very irregular; control and correction factors necessary; short time required but several measurements. (*d*) *Dielectric loss*: good accuracy for absolute water content; accuracy, in general, lower than with good resistance-type instruments; smooth, even surface required, and no great depth; short measuring time; m.c. range theoretically unlimited; effect of species, moisture distribution and temperature not sufficiently differentiated. In general (*a*) gives the most reliable results.

889. KRPAN, J. Untersuchungen über den Fasersättigungspunkt des Buchen-, Eichen-, Tannen- und Fichtenholzes. **[Investigations on the fibre-saturation point in Beech, Oak, Silver Fir and Norway Spruce wood.]** *Holz Roh- u. Werkstoff* 12 (3), 1954 (84–91). 24 refs. [G.] P.R.

Determinations of the fibre-saturation point (f.s.p.) by the method of volume shrinkage, gave the following results (the 3 figures representing the minimum, mean, and maximum moisture content (m.c.), respectively;) Beech in its natural range 25·7, 32·1, 36·7; Beech outside its natural range 28·2, 31·4, 35·5; Oak heartwood 18·2, 23·5, 35·2; Fir 21·1, 33·7, 45·5; and Spruce 23·9, 39·4, 45·2%. The number of specimens tested was 226–238 for each group. It was found that the relationship between compression strength (y) and m.c. (x) is logarithmic ($\log y = a + bx + cx^2$) below, and linear ($y = a_1 + b_1x$) above the f.s.p. The intersection points of the curve and straight line thus obtained yield f.s.p. values agreeing well with experiment. By neglecting the quadratic term in the logarithmic relationship, an exponential equation ($y = me_y^{-nx}$) is obtained for the relationship between compression strength ‖ (y) and m.c. (x)

below the f.s.p. It is preferable to use the compression-strength formula rather than the volume-shrinkage method for determining the f.s.p. of woods containing very volatile constituents. When using the volume-shrinkage method, a quadratic relationship was found to exist between the f.s.p. determined (y) and the edge of the test-piece cube (x), viz. $y = a - bx^2$, i.e. the greatest value was always obtained for the smallest specimen sizes and this agreed with that determined by the other method. In Oak the f.s.p. of stemwood is higher than that of roots or branches, and attains its maximum in the middle of a knot-free stem. Oak heartwood has a slightly higher f.s.p. than sapwood.

890. Vodoz, J. **Wood shrinkage and swelling.** *Transl. For. Prod. Lab., Can.* No. 74, 1954. pp. 8. Transl. from *Schweiz. Z. Forstw.* 104 (10), 1953 (508–17). [See *For. Abstr.* 15 (No. 1747).] Limited distribution.

891. Mariaux, A. Anisotropie de retrait transversal du bois. **[Anisotropy of transverse shrinkage of timber.]** [*Pap.*] *8th int. bot. Congr., Paris, Sect. 13A* 1954. pp. 13 + 2. 16 refs. [F.e.] X.

Reviews the various theories that have been put forward to account for this phenomenon, discussing the different factors involved (rays, inclination of fibrils in the cell walls, the properties of the walls and of the middle lamella, etc.).

892. Chalk, L. **The influence of gross anatomy on the shrinkage of wood.** [*Pap.*] *8th int. bot. Congr., Paris, Sect. 13A* 1954. pp. 6. [E.e.] X.

The average ratio of tangential to radial shrinkage is approximately the same in both hardwoods and softwoods, but this result may be achieved in different ways in these groups. The cause of differential shrinkage has long been regarded as lying in the secondary wall, and this appears to explain the greater shrinkage of dense wood and of the late wood of conifers. Others have sought the cause in the 'middle lamella', using this to explain the difference between radial and tangential shrinkage in conifers and the shrinkage of large rays in hardwoods. The relative importance of rays appears to depend on the proportion of the tissues which they occupy and possibly on cell size and shape. It is suggested that the question of which factor predominates in any particular wood depends on the gross anatomy of the wood. *Author's summary.*

893. Yamada, T., and Kadita, S. **[Adsorption of water vapour by wood. I and II.]** *Wood Res., Kyoto* No. 9, 1952 (42–62); No. 11, 1953 (5–20). 52 refs. [Jap.e.]

Graphs and equations have English legends.

894. Vorreiter, L. Holzkonstituenten und Raumquellung des Holzes. **[Constituents of wood and its volume swelling.]** *Holz Roh- u. Werkstoff* 12 (6), 1954 (223–6). 18 refs. [G.g.] P.R.

By plotting the available experimental data of volume swelling due to absorption of water against the contents of cellulose, lignin, and polyoses in wood, it is found that only the polyose content shows a relationship to swelling, expressible in the following equation:

$$\alpha_{v\ max} = a + bp^x,$$

where $\alpha_{v\ max}$ is the maximum volume swelling of wood, p the polyose content, a and b, empirical constants, and x, an exponent varying from 3·8 to 3·0 for the resin/fat/oil content range 1–7%. The polyose-content/oven-dry density (o.d.d.) relationship is linear for the European broadleaved and coniferous woods. Since the relationship between o.d.d. and maximum volume swelling is also linear, the following formula can also be used

$$\alpha_{v\ max} = m\frac{p + 0{\cdot}072}{0{\cdot}48},$$

where m is a specific coefficient (0·38 for Spruce, 0·34 for Fir, 0·31 for Beech). Provisional extraction tests have so far given conflicting results.

895. Runkel, R. O. H. Die Sorption der Holzfaser in morphologisch-chemischer Betrachtung. **[Sorption of wood fibres from the morphological and chemical points of view.]** *Holz Roh- u. Werkstoff* 12 (6), 1954 (226–32). 34 refs. [G.g.] P.R.

A survey of research on this subject during the past 20 years. The particular part played in absorption and desorption by hemicelluloses (wood polyoses) in delignified and whole woods is underlined. A plan for an investigation of chemically and morphologically defined wood-fibre preparations is outlined.

896. Schwabe, K., and Philipp, B. Zur Kinetik von Dampfsorption, Quellung und Flüssigkeitsaufsaugung der Zellulose. **[Kinetics of sorption of vapours and imbibition of liquids by, and swelling of, cellulose.]** *Holzforschung, Berlin* 8 (1), 1954 (1–12). 15 refs. [G.g.e.] P.R.

An attempt to explain the behaviour of 3 groups of liquids, as evident from the authors' own and other data, by the reaction between the hydrogen bonds of the cellulose and the molecules of the liquid.

897. Klenkova, N. I. Zamoraživanie drevesiny. **[Freezing of wood.]** *Ž. prikl. Him.* 27 (5), 1954 (539–45). 9 refs. [Russ.russ.] P.O.

It was found that only 20–45% of the water content freezes at − 5 to − 6° C. in freshly-felled 7- to 8-year-old Pine wood (moisture content 160–220%). Despite the almost identical content of water-soluble constituents, the amount of unfreezable water varies within wide limits for trees felled in different seasons. Repeated freezing of spring- or summer-felled wood decreases the proportion of unfreezable water, whereas this proportion remains practically constant in winter-felled wood. The proportion of unfreezable water is directly related to the content of water-soluble constituents, but even after their removal marked quantities of water remain unfreezable. Repeated freezing and thawing of sawdust in an excess of water, steadily increases the proportion of unfreezable water in this system.

898. Klenkova, N. I. Zamoraživanie celljuloznyh volokon. **[Freezing of cellulose fibres.]** *Ž. prikl. Him.* 27 (4), 1954 (433–44). 18 refs. [Russ. russ.] P.O.

Presents tabulated results of experiments on the effect of repeated freezing on the proportion of unfreezable water in: cotton linters, rayon, sulphite

cellulose, starch, chitin, and ethyl-cellulose/water, and on the effect of freezing on different properties of cellulose.

812.3 Density. Specific Gravity. Buoyancy

See also Nos. 904, 947–8, 1185.

899. GARDNER, G. Note sur la densité du bois d'espèces ligneuses des flores arctiques (subarctiques) et boréales en Amérique septentrionale (entre les 50e et 65e parallèles), comparée á la densité du bois des mêmes espèces croissant entre les 45e et 50e parallèles. **[The density of wood of species from the arctic (subarctic) and boreal flora in northern America (between the 50th and 65th parallels) compared with that of the same species growing between the 45th and 50th parallels.]** [*Pap.*] *8th int. bot. Congr. Paris, Sect. 13* 1954 (141–3). [F.] X.

Presents a table giving comparative weights of 22 species and varieties.

812.7. Strength Properties

See also Nos. 880, 889, 944, 948, 972–8, 983, 1029–30, 1099, 1122, 1195.

900. BURCHAM, J. N. **A variable temperature and humidity oven.** *J. sci. Instrum.* 30 (9), 1953 (335–6). 6 refs. [Forest Products Research Laboratory, Princes Risborough.] O.R.S.

The oven described was constructed to enable the elastic properties of wood to be studied over a given range of temperature [temp.] and relative humidity [r.h.]. Temp. can be controlled to about ± 1° C., and r.h. to about ± 1% except at temp. exceeding 90°. Humidity control is achieved by saturating air with water vapour at a known temp. and then heating the saturated air to a higher temp. The r.h. is given by the ratio of the saturation vapour pressure of water at the lower and higher temp. The r.h. may be set to any value between 30 and 95% over the temp. range 30–100°. The construction of the apparatus is illustrated.

901. **The effect of temperature on the strength of timber.** *Rep. For. Prod. Res. Bd., Lond. 1953*, 1954 (18).

Tests made on Basswood [*Tilia americana*?] in compression ∥ over a temperature range of 25–80° C. and an m.c. range from 7% to green, indicate that at all m.c.s any increase in the temperature of the wood above normal atmospheric temperature is accompanied by a decrease in the maximum crushing strength and the modulus of elasticity. The temperature/strength relationship is approximately linear over the range investigated. The decrease in strength varied from 0·75% to 1·14% of its value at normal temperatures for each 1° increase, depending on the m.c. of the material. At a given m.c. the effect of temperature on maximum crushing strength is in general proportional to the sp. gr. The method of controlling the temperature at the time of test while preventing any change in m.c. and a method of testing the effect of temperature on strength of Basswood in tension ⊥ are described. The latter test showed a linear decrease in strength with increasing wood temperature.

902. ISHIDA, S. **[The effect of temperature on the strength of wood.]** *Res. Bull. Exp. For. Hokkaido Univ.* 17 (1), 1954 (1–14). 7 refs. [Jap.jap.e.]

Tests on compressive strength and modulus of elasticity in static bending were made on *Picea glehnii* and *Betula maximowicziana* (solid and laminated wood respectively). Results are given in tables and graphs [with English legends]. Generally strength decreases with increasing temperature. *From author's summary.*

903. KLOOT, N. H. **The effect of moisture content on the impact strength of wood.** *Aust. J. appl. Sci.* 5 (2), 1954 (183–6). 3 refs. P.R.

Attempts to find a satisfactory empirical formula to represent the relationship between the two impact values (Izod and Madison toughness test) and the moisture content were not successful.

904. SIIMES, F. E., and LIIRI, O. Puun lujuustutkimuksia. **1.** Pienet virheettömat mäntykoekappaleet. **[Investigations on the strength properties of wood. 1. Tests on small clear specimens of Finnish Pine.]** *Tied. Valt. tekn. Tutkimusl.* No. 103, 1952. pp. 88. 21 refs. [Fi.fi.e.] P.R.

Methods of research on the strength of such specimens used in U.S.A., Canada, England, Germany and France are described. The test material for investigations at the State Institute of Technical Research [Helsinki], consisted of Pine of various sizes from 15 sawmills in different parts of Finland. Normal-sized beams were first tested and small clear specimens were then cut from their undamaged parts. English and American standard test methods were used. Results, shown in graphs and tables [with English legends], include the following: (1) Sp. gr. of Pine from N. Finland averages 0·47 and that from S. Finland 0·48 at a moisture content (m.c.) of 15%; the average value for the country is 0·475, with a range of variation from 0·325 to 0·775. (2) The influence of sp. gr. on strength properties is generally linear. (3) Below fibre-saturation point the effect of m.c., especially in static bending and compression strength, is large; tensile strength perpendicular to the grain and shearing strength reach a maximum at 10% m.c. (4) Pine from N. Finland was equal or superior to that from S. Finland except in bending strength and hardness. (5) Special test specimens (illustrated) gave values for shearing strength considerably below ordinary specimens. Tables and graphs show the influence of m.c., sp. gr. and width of annual rings on compressive strength perpendicular to the grain, shearing strength and impact bending. They also show the influence of size and form of the 'stamp' [a special rectangular compression head having smaller dimensions than the surface area of the test piece] and that of the shear caused by its edges on strength under compression. This shear effect is shown to depend both on the length of the stamp periphery, especially that part of it that shears the fibres and on the size and position of the stamp. *From authors' summary.*

905. VENET, J. Relations existant entre la qualité du bois et la largeur des accroissements annuels. **[The relationship between wood quality and the width of the annual rings.]** [*Pre-issue*] *Proc.*

Congr. int. Union For. Res. Organ., Rome 1953 Section 41 (No. 2), 1953. pp. 6. [F.] Limited distribution.

In softwoods, mechanical properties are best for annual-ring widths of 3 mm. or less, while in ring-porous woods, narrow ring widths are often associated with low mechanical strength. No relationship was found betwen ring width and mechanical strength in diffuse-porous woods.

906. MAYER-WEGELIN, H. Jahrringbreite und Holzgüte in Abhängigkeit von dem verschiedenartigen Aufbau des Holzgewebes innerhalb der Jahrringe. **[Annual-ring breadth and wood quality in relation to the varied structure of the wood within the annual ring.]** [*Pre-issue*] *Proc. Congr. int. Union For. Res. Organ., Rome 1953* Section 41 (No. 1), 1953. pp. 4. [G.]. Limited distribution.

A general discussion on the use of annual-ring breadth and variationsi n hardness within the annual ring [cf. *For. Abstr.* 15 (No. 624)] for determining wood quality and the effect of site on wood properties.

907. BANKS, C. H. **The mechanical properties of timbers with particular reference to those grown in the Union of South Africa.** *J. S. Afr. For. Ass.* No. 24, 1954 (44–65). 9 refs.

Tabulates important strength properties for 177 species, including 37 Eucalypts, 14 Pines and ca. 60 species indigenous to tropical Africa. Comparative data for mechanical properties of young compared with older material are given for *E. saligna* and 4 species of Pine. The method of applying these values to calculation of working stresses for structural timber is presented in detail.

908. **Working stresses of Canadian woods. Data sheet U-7.** *Pulp Paper Mag. Can.* 55 (8), 1954 (102).

Tabulates figures for safe working stresses in bending and compression for select-structural and structural grades of some 25 species.

909. NARAYANAMURTI, D., and JAIN, N. C. **A preliminary note on the use of vibrational method for following changes (improvement or degrade) in wood caused by treatments, decay, etc.** *Comp. Wood* 1 (3), 1954 (70). 3 refs. P.R.

[Cf. *For. Abstr.* 13 (No. 3311).] The elastic constants decrease and the damping capacity increases with progressing decay of rotary-peeled veneers of *Adina cordifolia, Dichopsis elliptica* and *Abies* sp.

910. **The effect of shear on the frequency of vibration of wooden beams.** *Rep. For. Prod. Res. Bd., Lond. 1953*, 1954 (48–9).

Agreement between observed frequencies for lengths of Brown Sterculia [*S. rhinopetala*] and those calculated from Rayleigh's formula for the vibrations of a long slender beam and corrected for shear is good, but the corrected frequencies are often 1% low. In interpreting the results this is relatively unimportant, but if shear modulus is calculated from the quantity $(f_t/f_o)^2 - 1$, where f_t is the frequency calculated from the uncorrected formula and f_o the observed frequency, a 1% error can lead to a considerably larger error in the shear modulus.

911. ARMSTRONG, L. D. **Project T.P.16. Rheology of wood. Sub-project T.P. 16–1. Creep in wooden beams. Progress report No. 2. Short term creep on air-dry wooden beams.** Division of Forest Products, C.S.I.R.O., Melbourne. 1953. pp. 6 + 7 gphs. P.R.

Small air-dry Mountain-Ash beams were loaded up to 27% of the modulus of rupture for the species, for ca. 2 days. The deflections increased appreciably during that period, the highest rate of increase being during the first 3–6 hours. A considerable proportion of the increase in deflection with time was irrecoverable.

912. **Abrasion.** *Rep. For. Prod. Res. Bd., Lond. 1953*, 1954 (18–9).

Red Selangan Batu [*Hopea* spp., *Shorea seminis* and *Shorea* spp.?] and 'Kilimanjaro Oak' (*Rapanea* sp.) seemed suitable respectively for domestic and public buildings and for industrial and other heavy-duty floors.

913. JONES, B. R. **The screw-holding power of veneered and laminated wood panels.** *J. For. Prod. Res. Soc.* 4 (3), 1954 (119–22). 4 refs.

Panels of plywood and laminated wood showed better screw-holding ability than solid wood: this better screw-holding was a function of the glue-line properties and independent of the grain direction in adjacent plies. It was found to result largely from the densification of the wood during pressing and the strengthening of the wood fibres by the adhesive. With both urea-formaldehyde and phenol-formaldehyde adhesives, screw-holding in hot-pressed panels and in those with thin veneers was better than in cold-pressed panels and those with thick veneers respectively.

812.8. Workability. Working Properties

See also No. 880.

914. MCINTIRE, S. H. **The machining of Beech.** *Beech Utiliz. Ser. Ntheast. For. Exp. Sta.* No. 9, 1954. pp. 6. 4 refs.

The working properties (planing, turning, shaping, boring, mortising, sanding and nailing) of Beech [*Fagus grandifolia*] are compared with those of Birch and Maple, which it closely resembles.

813. *Wood Chemistry*

See also Nos. 131–2, 400, 946, 1119, 1181 *et seq.*

915. **List of publications on chemistry of wood and derived products.** *Rep. U.S. For. Prod. Lab., Madison* No. *R*238, 1954. pp. 45. P.R.

916. ŠARKOV, V. I., EFIMOV, V. A., and MUROMCEVA, V. S. O vlijanii uslovïï rosta na himičeskiï sostav drevesiny eli. **[Effect of growth conditions on the chemical composition of Spruce wood.]** *Ž. prikl. Him.* 27 (1), 1954 (92–6). [Russ. russ.] P.O.

The authors found that, irrespective of the conditions of growth, the pentosan content decreases from pith to periphery and from top to base, whereas that of methylpentosans increases from pith to periphery and from base to top. The chemical composition of Spruce wood depends, in the first

place, on the age of the growth rings, and not on their width.

917. Šarkov, V. I., and Muromceva, V. S. O himičeskom sostave drevesiny èvkalipta. **[Chemical composition of Eucalypt wood.]** *Ž. prikl. Him.* 27 (6), 1954 (687–8). 1 ref. [Russ.russ.] P.O.

Presents tabulated results of the chemical analysis of: *Eucalyptus macarthuri, E. dealbata, E. viminalis, E. viminaloides, E. cinerea, E. bicostata* and *E. globulus*, all of them grown near Sukhum (U.S.S.R.). It was found that the average chemical composition of the woods of these species differs from that of broadleaved species in general in having a higher lignin, and lower pentosan, content.

813.1. Chief Organic Constituents. Constituents of the Cell Wall

See also Nos. 860–8, 894–6, 1116–7.

918. Janovskiĭ, V. V., Malevskaja, S. S., Evtropjeva, E. I., and Avrunina, B. M. Polučenie drevesnoĭ celljulozy pri pomošči organičeskih rastvoriteleĭ. **[Obtaining wood cellulose with the aid of organic solvents.]** *Ž. prikl. Him.* 27 (3), 1954 (334–40). [Russ.russ.] P.O.

Anhydrous ethylene glycol and glycerol are very effective delignifying solvents at 110–150° C. for wood, whereas the same solvents in aqueous solution are much less effective. On the other hand, monohydric compounds (ethanol, butanol) are more effective as lignin solvents when mixed with water.

919. Stumpf, W., Weygand, F., and Grosskinsky, O. A. Synthese von Dioxan-[^{14}C] und Anwendung als Extraktionsmittel für lösliches Lignin. **[Synthesis of C^{14}-labelled dioxane and its use as extraction solvent for soluble lignin.]** *Chem. Ber.* 86 (11), 1953 (1391–401). 4 refs. [G.g.] P.R.

Lignin extracted with C^{14}-dioxane mixed with water and HCl was found to be free of dioxane or its products.

920. Brauns, F. E. Ungelöste Probleme der Ligninchemie. **[Unsolved problems of the chemistry of lignin.]** *Papier, Darmstadt* 7 (23/24), 1953 (446–52). 15 refs. [G.g.] L.S.

Discusses, *inter alia*, the following problems: definition of lignin; bonds between lignin and other constituents; and research on native lignins and 'colloidal' wood.

921. Kjuršner [Kürschner], K. Ob aromatičeskoĭ i uglevodnoĭ časti prirodnogo lignina. **[The aromatic and carbohydrate portions of native lignin.]** *Ž. prikl. Him.* 27 (7), 1954 (769–73). 3 refs. [Russ.russ.] [Slovakian Academy of Sciences, Bratislava.] P.O.

Nitration of lignin, using absolutely dry Spruce and Beech sawdust and absolutely anhydrous HNO_3, showed that a portion of lignin was transformed into an easily determinable aromatic nitrolignin which could be precipitated from solution. The author concludes that a part of elementary lignin in wood (ca. $\frac{1}{3}$ of total lignin in Spruce, and ca. $\frac{1}{7}$ in Beech) consists of aromatic compounds.

922. Freudenberg, K., and Dietrich, H. Synthese des *d,l*-Pinoresinols und andere Versuche im Zusammenhang mit dem Lignin. **[Synthesis of *d,l*-pinoresinol and other experiments relating to lignin.]** *Chem. Ber.* 86 (9), 1953 (1157–66). 13 refs. [G.g.] P.R.

Describes the synthesis and isolation of the compound and discusses its stereochemistry. An amorphous dehydration-type condensation product is obtained when redoxase acts on *d,l*-pinoresinol.

923. Richter, G. A., and Pancoast, L. H. **Sulphonation of wood lignin.** *Tappi* 37 (6), 1954 (263–72). 5 refs. P.R.

The work reported covers sulphonation and delignification of several wood species with sulphurous-acid solutions of increasing concentrations and over a wide spread of temperatures. Low-temperature sulphonations were made over periods of time extending to 16 months, and in many instances were followed by short high-temperature digestions. Degree of sulphonation of the wood lignin was determined and removal of solubilized lignin measured. It is shown that: (1) With 10% SO_2 solution there is progressive extraction of lignin over long periods of treatment at room temperature but at no time up to a 16-month soak did the chemically combined S in the wood substance exceed 8% based on lignin. (2) Rate and degree of sulphonation is dependent on SO_2 concentration and temperature. At a given SO_2 concentration, rate of sulphonation is depressed as increasing %s of combined SO_2 are added to the solution. (3) Combined S in the extracted lignosulphonate reaches levels of 8 to 10% when sulphonations are carried out at room temperature. (4) Prehydrolysis interferes both with low-temperature sulphonation and with subsequent pulping in SO_2 solution at elevated temperature. (5) High-temperature hydrolysis of presulphonated wood with solutions containing no SO_2 resulted in only partial delignification except where presulphonation had been done with SO_2 solution to a level of over 4% S based on lignin. Similar delignification of wood that had been sulphonated with bisulphite or sulphite at high temperature proved much more difficult. (6) Sulphonation of Birch lignin with low-temperature SO_2 solution is much slower than found with Hemlock, Spruce and Douglas Fir. (7) A very rapid and almost complete extraction of lignin from Hemlock is possible by a process comprising a 2-week sulphonation with 10% SO_2 solution at room temperature followed by a 2- to 4-hr. digestion in the same liquor at 120° C. *From authors' summary.*

924. Gardner, J. A. F. **The ethanolysis of 3 - hydroxy - 1 -(4-hydroxy-3-methoxyphenyl)-2-propanone in relation to lignin chemistry.** *Canad. J. Chem.* 32 (5), 1954 (532–7). 26 refs. O.R.S.

On ethanolysis this ketol yielded the 4 propylphenols which can be isolated from the ethanolysis products of conifer lignin isolated or *in situ*. The significance of this result is briefly discussed. *From author's summary.*

925. Merewether, J. W. T. **Studies on the lignin of *Eucalyptus regnans* F. Muell. X. The ethanolysis of an isolated alkali lignin.** *Aust. J. Chem.* 7 (1), 1954 (75–82). 7 refs. O.R.S.

926. MEREWETHER, J. W. T. **Lignin. XI. The effect of extraction of wood on the composition of isolated lignins.** *Holzforschung, Berlin* 8 (3), 1954 (68–71). 8 refs. [E.e.g.] P.R.

Thiolignin was isolated from *Eucalyptus regnans*, *E. obliqua* and *E. sieberiana*, using both CO_2 and H_2SO_4 for the acidification of the black liquor.

927. NOBÉCOURT, P., and MAZEN-PAPIER, M. T. Modifications des réactions colorées des tissus lignifiés traités par divers agents chimiques. **[Modifications of the colour reactions of lignified tissues treated with different chemical reagents.]** *Bulletin, Association Technique de l'Industrie Papetière, Paris* 1954 (1), (11–3). 3 refs. [F.f.] P.A.T.R.A.

The effect of the following chemicals on the conventional colour reactions has been studied: Na_2CO_3, H_2O_2, $Cl_2 + H_2O$, Cl in CCl_4, and HNO_3 (Day method, and aceto-nitric method). The order in which different colour reactions disappear when wood has been treated with Cl in CCl_4 is the reverse of that in which they appear during the lignification of the membranes.

928. PEPPER, J. M., and HAGERMAN, D. C. **The isolation and oxidation of Aspen lignins.** *Canad. J. Chem.* 32 (5), 1954 (614–27). 17 refs. O.R.S.

929. STEWART, C. M. **Sub-project C.5–4—Association of carbohydrates within themselves and with lignin. Progress report No. 6. An outline of the composition and nomenclature of wood polysaccharides.** Division of Forest Products, C.S.I.R.O., Melbourne. 1953. pp. 10. 16 refs. Also in *Holzforschung, Berlin* 8 (2), 1954 (46–8). [E.e.g.] P.R.

Presents a brief review of the chemistry of the (non-cellulose) wood polysaccharides, and puts forward a systematic classification and nomenclature, based on normal carbohydrate nomenclature and on the suggestions of A. G. Norman.

930. TANIGUCHI, E. **[Chemical studies on the crystallized region and non-crystallized region of cellulose from various trees.]** *Bulletin of the Yamagata University (Agricultural Science), Yamagata* No. 1, 1950 (107–16). 7 refs. [Jap.e.] C.G.B.

Microscopic studies on 35 species have shown mean %s of 54·85 in all trees, 56·75 in conifers and 54·28 in deciduous trees for the true crystallized, and 40·55, 40·00 and 40·72 respectively for the true non-crystallized regions. There is also a pseudo-crystallized region. *From author's summary.*

931. ASPINALL, G. O., HIRST, E. L., and MAHOMED, R. S. **Hemicellulose A of Beechwood (*Fagus sylvatica*).** *J. chem. Soc.* June 1954 (1734–8). [University of Edinburgh.] O.R.S.

932. **Softwood mannan.** *Rep. For. Prod. Res. Bd., Lond. 1953*, 1954 (43).

A polysaccharide containing mannose and glucose units only has been isolated from Sitka Spruce.

933. MCKENZIE, A. W. **Project C.1—Methods for wood and pulp analysis. Sub-project C.1–8—Determination of uronic acid groups. Progress report No. 2. Modifications to the decarboxylation method for the determination of uronic acid groups in wood.** Division of Forest Products, C.S.I.R.O., Melbourne. 1953. pp. 7 + 1 dgm. + 3 gphs. + 1 tbl. 3 refs. P.R.

813.2. Minor Organic Constituents. Extractives. Cell Contents

See also Nos. 876, 894, 1120.

934. MCGRAY, R. J., and MCDONOUGH, E. S. **Antimycotic effects of an extract of Catalpa.** *Mycologia* 46 (4), 1954 (463–9). 4 refs. P.R.

[Cf. *For. Abstr.* 12 (No. 3044).] A substance rather unstable when dissolved in water and relatively resistant to heat and alcohol, was obtained from the heartwood of *Catalpa speciosa*; it was found to retard the growth of 22 species belonging to the higher categories of mycelioid fungi. The maximum retardation was for wood-rotting fungi.

935. **Extractives of *Shorea* species.** *Rep. For. Prod. Res. Bd., Lond. 1953*, 1954 (45–6).

Discusses the results of small-scale extractions of *S. leprosula* and *S. laevis* and of large-scale extractions of *S. leprosula.*

936. HASEGAWA, M., and SHIRATO, T. **On phenolic substances in wood. I. The pigments of the heartwood of *Rhus vernicifera*. III. A flavanol obtained from the heartwood of *Larix leptolepis*.** *Journal of the Chemical Society of Japan, Tokyo* 72, 1951 (223–4; 279–80). [Jap.] Title in *Jap. Sci. Rev. (biol. Sci.)* No. 2, 1953 (18). I.I.E.

Cf. *For. Abstr.* 14 (No. 3760).

937. FUJITA, K., WATANABE, Y., and MATSUURA, T. **On the phenolic constituents of Beechwood (*Fagus crenata* Blume) tar.** *Journal of Science of the Hiroshima University* 15*A*, 1951/52 (155–60). 19 refs. [E.] E.R.

It was found that the phenol fraction whose Na salt was soluble in NaOH solution consisted mainly of *o*-cresol, guaiacol, creosol, and *n*-propylguaiacol, while the fraction whose Na salt was sparingly soluble in NaOH solution consisted mainly of trihydric phenol derivatives.

938. KING, F. E., and BOTTOMLEY, W. **The chemistry of extractives from hardwoods. Part XVII. The occurrence of a flavan 3:4-diol (melacacidin) in *Acacia melanoxylon*.** *J. chem. Soc.*, May 1954 (1399–1403). [The University, Nottingham.] O.R.S.

939. ROBERTSON, A., and WHALLEY, W. B. **The chemistry of the 'insoluble red woods'. Part V. Pterocarpin and an oxidation product of homopterocarpin.** *J. chem. Soc.* May, 1954 (1440–1). [The University, Liverpool.] O.R.S.

Cf. *For. Abstr.* 13 (Nos. 646–7).

940. KING, F. E., HOUSLEY, J. R., and KING, T. J. **The chemistry of extractives from hardwoods. Part XVI. Coumarin constituents of *Fagara macrophylla, Zanthoxylum flavum*, and *Chloroxylon swietenia*.** *J. chem. Soc.* May, 1954 (1392–9). [The University, Nottingham.] O.R.S.

813.5. Reaction with Metals
See No. 1045.

813.6. Effect of Chemicals on Wood. Resistance to Chemical Attack
See also Nos. 1045, 1130.

941. ZIMAKOV, P. V., and POKROVSKIĬ, V. A. Ob odnoĭ osobennosti vzaimodeĭstvija parov okisi ètilena s drevesinoĭ. **[A peculiarity in the interaction between the vapours of ethylene oxide and wood.]** *Ž. prikl. Him.* 27 (3), 1954 (346–8). 6 refs. [Russ.] P.O.

The authors found that pieces of wood not impregnated previously with an alkali, when kept for a long time in C_2H_4O vapour, sometimes change their colour (to brown or black) but neither change their dimensions nor bind large quantities of C_2H_4O. When impregnated with alkali, the bulk of the wood reacts with the vapour which diffuses slowly into it. Products of this reaction seem to exert pressure from inside on the structural elements of the wood; these markedly increase in volume, the wood swelling and becoming loose-structured. After several weeks in C_2H_4O vapour, wood swells uniformly in all directions and presents the appearance of untreated wood observed through a magnifier.

942. GOBIE, C. H. **The chemical resistance of timber.** *Wood* 19 (8), 1954 (322–5).

Discusses properties of woods suitable for chemical and industrial use, and for use in food containers.

813.7. Odour and Taste
See No. 942.

814. *Natural Durability. Old Wood. Fossilized Wood*
See also Nos. 255, 847–8, 934, 1002, 1126–7, 1129, 1148.

943. JØRGENSEN, E. Fra Bregentveds egeskove. Modstandsevne imod svampeangreb hos bredringet og smalringet egekærne. **[From the Bregentved Oak woods. Resistance to fungal attack of broad- and narrow-ringed Oak heartwood.]** *Dansk Skovforen. Tidsskr.* 38 (6), 1953 (452–66). 7 refs. [Dan.e.]

Test material was taken from 3 trees each of 57-year *Quercus robur* (1) heavily thinned and (2) unthinned (from the surround of the thinned plot). Sixteen samples were prepared from each tree as follows [figures in brackets giving the mean ring breadths in mm. of (1) and (2) respectively, for the zone concerned]: inner heartwood (h.w.) (1·9, 2·1), outer h.w. (1·4, 3·1), and sapwood (s.w.) (1.0, 2·9). One-half of the samples were exposed to *Coniophora cerebella* and one-half to *Polyporus sulphureus*, for 8 months, when the weight loss based on dry weight at 100° C. was determined. The initial dry weight was found by correction of the weight at 22° C. in order to avoid heating the samples. Results showed no difference in resistance as between h.w. of (1) and (2). For all trees, and with both fungi, the inner h.w. was decayed more seriously than the outer. *C. cerebella* caused the greatest weight loss. The cultures with s.w. became contaminated with *Chaetomium globosum.*

944. LARGIN, I. F. Pročnostj i vodopogloščenie drevesiny pneĭ i stvolov sosny, vstrečaemyh v torfjanyh zaležah. **[Strength and water absorption of the wood of Pine stumps and trunks encountered in peat deposits.]** *Torfjanaja Promyšlennostj, Moskva* 31 (1), 1954 (18–21). [Russ.russ.] P.O.

Measurements showed that the stem and root wood of Pine found in peat deposits in a good state of preservation have, at equal moisture contents (m.c.), nearly the same strength properties as living Pine. As the m.c. of the Pine removed from the deposit falls from the high original value (up to ca. 200%) to 25%, the strength increases gradually, and below 25% rapidly. Empirical formulae and plots are presented for determining the temporary compression and bending strength of Pine stumps and stems at different m.c.s. When re-soaked in water after being air-dried, they reach a density value > 1 in 400–800 hours.

945. RAMANUJAM, C. G. K. **Fossil woods belonging to Guttiferae, Celastraceae, Leguminosae, Sonneratiaceae and Euphorbiaceae from tertiary rocks of South Arcot district, Madras.** *J. sci. industr. Res., India* 13*B* (2), 1954 (146–7). 1 ref. D.S.I.R.

815. *Effect of Growth Factors on Structure and Properties*
See also Nos. 400, 467, 861, 869–70, 872, 877–8, 899, 904–7, 916, 943, 1168–9, 1187.

946. PECHMANN, H. VON. Untersuchungen über Gebirgsfichtenholz. **[The timber of mountain Norway Spruce.]** *Forstwiss. Cbl.* 73 (3/4), 1954 (65–91). 31 refs. [G.]

Eleven trees were felled and examined in 4 different stands of the northern Tyrol, and comparative information is presented on the following: dendrochronology, the variation in oven-dry weight of the wood throughout the stem, green weight of the branches, stem form, annual-ring width, variation in green weight of the wood throughout the stem and its relation to annual-ring width, proportion of late to early wood, wood structure, strength, elasticity, hardness and chemical properties.

947. KEYLWERTH, R. Ein Beitrag zur qualitativen Zuwachsanalyse. **[A contribution to qualitative increment analysis.]** *Holz Roh- u. Werkstoff* 12 (3), 1954 (77–83). 7 refs. [G.g.] P.R.

Presents the results of an investigation on the width of growth rings, and variations in their basic density, the latter being taken as the characteristic of wood quality. Describes a new instrument for measuring accurately the growth-ring width and for cutting small wood specimens for density determinations. Calculations of basic density (oven-dry weight/green volume) should be based on 'saturated density' (weight and volume in a water-soaked condition) and the absolute density of wood substance (ca. 1·5 g./c.c.) in preference to direct determination from o.d. weight and green volume, the former method giving more accurate results with specimens of 1–8 c.c. Measurements on a Douglas Fir stem section showed that, within a decade, there was no correlation between the (randomly distributed) density variations and either tree height or

compass direction. On the other hand, specimens taken from woods grown in different decades showed significant differences in basic density. Since the width of the growth rings diminishes with increasing age and the basic density of their wood increases, the fall in *weight* increment is less pronounced than that of *volume* increment.

948. Dąbrowski, A. Ciężar właściwy i wytrzymałość na zginanie statyczne drewna sosnowego w trzech głównych warstwach przekroju strzały drzewa. **[Density and static bending strength of Pine wood at three depths in a stem section.]** *Sylwan* 97 (3), 1953 (216–22). [Pol.]

The test pieces were taken from 9 stems (age 183–189 years, d.b.h. 36·5–54·0 cm., height 27·0–32·4 m., radius of crown projection 2·4–5·3 m.) at $\frac{1}{3}$ of stem height. Each disc supplied 12 samples: 4 each of (1) the central sapwood layer, (2) the heartwood mid-way between periphery and the pith and (3) heartwood 2–5 cm. from the pith. Statistical analysis of results has shown that the difference between the density of (1) and (2) is significant, whereas that between the density of (2) and (3), and (1) and (3) is not. The differences between the static bending strength of (1) and (2), and (2) and (3) are significant, while the difference between (1) and (3) is not. Correlation between bending strength (at 15% moisture content) and basic density is very high for all three.

82. CONVERSION, SHAPING, ASSEMBLY AND FINISHING OF WOOD: GENERAL

949. Petrovskaja, M. N. Novye GOST na derevorežuščiĭ instrument. **[New Soviet standards for wood-cutting tools.]** *Derev. lesohim. Prom.* 3 (8), 1954 (9–12). [Russ.] P.R.

Discusses new elements in the following standards: GOST 980–53 circular saws; GOST 6567–53 flat cutters with straight edge for wood cutting; and GOST 6532–53 band saws.

950. **[New sawmill machinery.]** *Timb. Tr. J.* Ann. spec. issue, 1954 (304–13).

Describes briefly with some illustrations new machines by 17 firms.

951. Fronius, K. **Saw-mill machinery at the Technical Fair Hanover 1952.** *Transl. Commonw. sci. industr. Res. Organ. Aust.* No. 1987, 1953. pp. 12 + 15 photos. Transl. by F. O. Radok from *Holz Roh- u. Werkstoff* 10 (4), 1952 (138–44). [See *For. Abstr.* 13 (No. 4237).] Limited distribution.

952. Abermals mehr Holzbearbeitungsmaschinen auf der Hannover Messe. **[Still more woodworking machines at the Hanover fair.]** *Int. Holzmarkt* 45 (8), 1954 (11–24). [G.]

Describes briefly with some illustrations, machines shown by over 100 firms, mostly German.

821. *Barking*

See also No. 524.

953. **Barker review.** *Lumberm.* 81 (9), 1954 (68 . . . 96, 117).

Discusses the selection of barkers, lists different types (with details of design and advantages and manufacturers), and discusses the barkers (including two mounted on barges) used by various N. American mills.

954. Beeman, W. H. **Comparison of log barkers.** *Tappi* 37 (8), 1954 (145*A*–148*A*). P.R.

A brief description and performance appraisal of several pulp-mill log barkers now used in the U.S. pulp and paper industry.

955. **Saw log debarker of cutter-head type.** *Paper Tr. J.* 138 (32), 1954 (34). P.R.

Illustrated description of the 'Hurricane Sawlog Debarker' which includes a 60-h.p. power unit, control over depth of cut, a bark conveyor below the feed mechanism, and variable control of speed. The production rate for logs of 8–16 in. diam. varies from ca. 35,000 to 100,000 bd. ft. daily.

956. **Pitprop debarking machine. Special design to handle short lengths.** *Timb. & Plyw.* 107 (2767), 1954 (140). P.R.

Illustrated description of a recently exhibited prototype machine capable of barking short pitprops at the rate of 4000–5000 cu. ft./week.

957. **Pitprop production.** *Timb. Tr. J.* 210 (4063), 1954 (638–9).

Describes with illustrations an automatic cross-cut saw and a disc-type barker, both specially designed for pitprops and fully mobile, manufactured by Cundeys, Ltd., Alfreton, Derbyshire.

822. *Saws and Sawing*

See also Nos. 1042, 1055.

958. Hanin, I. F. Novoe v tehnike bezopasnosti na derevoobrabatyvajuščih predprijatijah. **[New safety measures in woodworking plants.]** *Lesn. Prom.* 13 (2), 1953 (26–30). [Russ.]

Illustrated description of: (1) a device (braking gate) preventing the kick-back of slabs fed to a slab resaw machine, and (2) a self-locking guard for sawbenches with 2 or more blades.

959. Fronius, K. Der Einschnitt von Rohhoblern aus einheimischen Holzarten. **[The breakdown of logs [for the manufacture of floorboards and other planed products] from indigenous [German] species.]** *Holz-Zbl.* 80 (82), 1954 (997–8). [G.]

An illustrated discussion of the most economical methods of breaking down Spruce and Pine logs.

960. Popović, V. Racionalno iskorišćavanje drveta pri izradi nemačke dužice. **[Rational utilization of timber in the manufacture of German [dressed on the curve?] staves.]** *Šumarstvo* 7 (6), 1954 (348–54). [Serb.f.g.]

Mathematical analysis shows that the best yield of first-quality (quarter-sawn) staves is obtained from logs the top diameter of which is 7·64 times the thickness of the stave.

961. Banerji, J. **Design of bandsaws.** *Indian For.* 80 (7), 1954 (363–72). 8 refs.

Difficulties arose in sawing the wide variety of local timbers at Port Blair, Andamans. The resulting investigations are described in detail, and a specification is given for a bandsaw blade which, when properly tensioned, will cut reasonably well

many, or most, of the different types of wood coming daily to the mill.

962. SAITO, Y., and NIGA, T. **[Buckling in circular saws. (II).]** *Wood Ind., Tokyo* 9 (7), 1954 (317–22). [Jap.e.] P.R.

963. HAYCOCK, A. H. **The cracking of wide bandsaws.** *Wood* 19 (7–9), 1954 (304–7; 338–40; 380–2).

Prevention and repair.

964. ŽEMČUŽNIKOV, P. Èlektrokontaktnyĭ sposob zakalki zubjev pil. **[The electrical-contact method of hardening saw-teeth.]** *Lesn. Prom.* 13 (9), 1953 (31). [Russ.]

One end of the low-voltage winding of a 0·2–0·3 KW transformer (primary winding 220, secondary 2–3 volts) is connected to the body of the frame-saw, and the other to a contact tool incorporating a switch to the high-voltage winding. The flat point of the tool is applied to the tip of the tooth, and the current passed for 1–2 sec.

823. *Planing, Cutting of Mouldings. Chiselling, Mortising and Tenoning. Boring. Turning*

See also No. 1042.

965. **[Planing research.]** *Rep. For. Prod. Res. Bd., Lond. 1953*, 1954 (19–21).

Results to date of tests on Agba and Beech indicate that net power demand is not directly proportional to the feed speed, its rate of increase lessening slightly with rise of the latter. This effect becomes more noticeable when the cutting angle is reduced and considerably more power is required. For a given cutting angle, spindle speed, and feed speed, it has also been found that less power is required when the number of knives in cut is reduced. In tests on Beech, with 30° cutting angle, spindle speed 4000 rev./min., and feed speed 50 ft./min., the net power was reduced by 25% and by more than 50% by using 4 and 2 knives respectively instead of 6 and by about 37% with 2 knives instead of 4.

966. **East German designs: details of three new machines—heavy duty thicknesser, single-end tenoner and slotter and parquetry fillet planer.** *Timb. Tr. J.* 210 (4064), 1954 (810*b-c*).

The thicknesser and planer are made by Mihoma works, Leipzig, and the tenoner by the Ellma factory, Ellefeld.

967. SHERLOCK, F. E. **Special-purpose woodworking machines—10. Special equipment. 11. The rounded end tenoner.** *Wood* 19 (1; 2), 1954 (62–4; 92–5).

968. **Boring in end grain.** *Wood-Worker, Indianap.* 73 (5), 1954 (14). P.R.

Lists several methods of ensuring straight boring, e.g. using special pointless bits, or making the wood piece revolve while a non-revolving bit bears on the wood; or else greased wire, glued between two pieces of wood, is removed after setting, and the bit follows the channel left by the wire.

969. WESTWOOD, A. **Woodworking cutter blocks—some technical aspects.** *Wood* 18 (6; 7), 1953 (238–40; 283).

970. GRINDROD, J. **New type grinding machine for wood-working blades.** *Woodwkg. Ind.* 11 (8), 1954 (471–2). P.R.

Illustrated description of a new Swiss wet-grinding machine with an oscillating movement of the grinding wheel, which is claimed to equalize wear and ensure optimum cooling action.

971. WEINHOLD, W. Schleifmaschinen für Holz-Hobel-, Schäl- und Scherenmesser. **[Grinding machines for knives of wood planers, peelers and clippers.]** *Holz Roh- u. Werkstoff* 12 (4), 1954 (151–7). 10 refs. [G.g.] P.R.

Machines shown at the Hanover Fair, 1954.

824. *Forms of Joint. Jointing and Assembly*

824.1. Nailed Joints

See also No. 1031.

972. **The strength of nail joints.** *Rep. For. Prod. Res. Bd., Lond. 1953*, 1954 (16–7).

Three variables were studied in tests of joints with round wire nails: (1) the type of loading, whether single or double shear: (2) the number of nails; and (3) thickness of the members joined. The following conclusions have been drawn from a preliminary analysis of results: (1) nails loaded in double shear give joints 50–75% stronger than those in single shear; (2) the maximum load carried by the joints is directly proportional to the number of nails used in the range 1–4 nails; and (3) the strength of 3-member joints increases with decrease of the centre member, while that of 2-member joints increases with increase in thickness of the member receiving the nail point. All joints are extremely stiff initially, 3-member joints with 2-in. 12-gauge nails giving a slip of $\frac{1}{100}$ in. at half maximum load compared with a slip of $\frac{1}{4}$ in. at maximum load.

973. STERN, E. G., and STONEBURNER, P. W. **Design of nailed structures.** *Bull. Va. polyt. Inst.* 45 (6), 1952. pp. 67. 41 refs. P.R.

Three papers: (1) Fundamental considerations in the design of nailed structures (*E. G. Stern* [cf. *For. Abstr.* 15 (No. 1820)]; (2) Three-member joints for nailed trussed rafters (*P. W. Stoneburner*), and (3) Nailed vs. bolted vs. connectored trussed rafters (*E. G. Stern* and *P. W. Stoneburner*) [cf. *For. Abstr.* 15 (No. 1895)]. In (2), tests on 3-member Southern Pine joints showed that low-carbon-steel, plain-shank and helically threaded nails loaded in double shear carry twice the single-shear loads, while hardened high-carbon-steel nails loaded in double shear carry considerably less than twice the single-shear loads.

974. STERN, E. G., and STONEBURNER, P. W. **Nailed structural joints reinforced with toothed-ring fasteners.** *Bulletin, Wood Research Laboratory, Virginia Polytechnic Institute, Blacksburg* No. 6, 1951. pp. 8. P.R.

The results of tests with (1) nailed joints, (2 fastener-reinforced nailed joints, and (3) and (4)

bolted joints of two bolt sizes show that the efficiency in load-carrying capacity of (2) lies in their great loads at relatively small joint deformations. Moreover, they are cheaper and lighter in weight.

975. STERN, E. G. **Effectiveness of nails versus staples for fastening underlayment**. *Bulletin, Wood Research Laboratory, Virginia Polytechnic Institute, Blacksburg* No. 13, 1954. pp. [6]. PR.

976. STERN, E. G. **Strength of auto-nailer assembled skids**. *Bulletin, Wood Research Laboratory, Virginia Polytechnic Institute, Blacksburg* No. 10, 1952. pp. 15. P.R.

Skids assembled with an Auto Nailer and jointed with auto nails have been found superior in torsional rigidity, edgewise compression stiffness and load-carrying capacity to those assembled by hand hammer and jointed with plain-shank nails. The latter technique sometimes gave rise to splitting during assembly.

977. SCHOLTEN, J. A. **Effect of nail points on the withdrawal resistance of plain nails**. *Rep. U.S. For. Prod. Lab., Madison* No. 1226 (rev.) 1953. pp. 3 + 1 tbl. P.R.

The results of tests on wood of 6 species (broad-leaved and conifers) show that (1) in light-weight woods or in dense species that do not split in nailing, the highest withdrawal resistance is obtained with sharp-pointed nails. Procedures are recommended for wood that splits seriously with common nails.

978. STERN, E. G. **Immediate vs. delayed holding power of nails**. *Bulletin, Wood Research Laboratory, Virginia Polytechnic Institute, Blacksburg* No. 8, 1952. pp. 12. 7 refs. P.R.

Plain-finished, cement-coated, and etched plain-shank nails showed a marked decrease in resistance to withdrawal, whereas threaded-shank nails usually retained this resistance as time progressed, when the wood had a considerable moisture content. The differences in load-carrying capacities under the same conditions are significant.

824.2. Screwed Joints

See No. 913.

824.5. Timber Connectors

979. **Design manual for timber connector construction. Supplement No. 1. 4 in. diameter 'Teco' double-bevelled split-ring timber connectors**. Macandrews & Forbes Ltd., London. [*n.d.*]. pp. [3]. P.R.

824.8. Glues and Gluing

See also Nos. 1021–2, 1258.

980. **List of [Madison] publications on glue, glued products, and veneer**. *Rep. U.S. For. Prod. Lab., Madison* No. 513, 1953. pp. 19. P.R.

981. HYLER, J. E. **Glue and gluing. Parts 25–38**. *Sth. Lumberm.* 187 (2344–5), 1953 (31 . . .34; 247 . . . 252); 188 (2346–57), 1954 (41 . . . 46; 41 . . . 44, 67; 51 . . . 55; 41 . . . 46; 51 . . . 54, 74; 51 . . . 56; 37 . . . 42, 80; 41 . . .47; 51 . . .54, 76; 43 . . .48; 43 . . .47).

[Cf. *For. Abstr.* 15 (No. 2887).] Discusses mainly methods and equipment.

982. HYLER, J. E. **Glue and gluing. Parts 39 to 44**. *Sth. Lumberm.* 189 (2358–2363), 1954 (35 . . . 40; 51 . . . 54; 45 . . . 48; 39 . . . 42; 45 . . .50; 51 . . . 55).

Discusses mainly the use of electronic presses and edge gluing. [Cf. *For. Abstr.* 15 (No. 2887).]

983. SAUER, E. Über das Verhalten der Bindung von Holzleimen bei Dauerbeanspruchung. [**Behaviour of the wood-glue bond during continuous stress.**] *Holz-Zbl.* 80 (97), 1954 (1155–7). [G.g.]

[Cf. *For. Abstr.* 1 (p. 97).] Discusses different current methods of determining the fatigue breakdown of glue-lines under oscillating load, and describes a new method whereby a test piece consisting of two end-grain-glued halves of an 8·5 × 1·0 × 1·0-cm. stick is rotated horizontally, one end being inserted into a rotating chuck, and the other end loaded with a weight suspended from a ball-race so that the motion is not transmitted to the weight. Two variants of the testing procedure are described, and results of a number of tests with casein, urea-formaldehyde, and ordinary bone glue are given. Bone glue seems to withstand the fatigue test exceptionally well, and values nearly as high are obtained for casein glue. The graph obtained for the synthetic-resin glue mix used shows a greater drop in strength.

984. OLSON, W. Z., and BLOMQUIST, R. F. **Gluing techniques for Beech**. *Beech Utiliz. Ser. Ntheast. For. Exp. Sta.* No. 5, 1953. pp. 20. 13 refs.

Includes information on the best types of glue for use indoors and outdoors, recommended gluing conditions, and inspection and control to ensure such conditions.

985. ŻUCHOWSKI, W. Fenolowo-formaldehydowy wiążący na zimno klej Fortil. Charakterystyka, własności i sposób użycia. Badanie własności spoiny klejowej. Badanie optymalnych warunków stosowania kleju. [**The cold-bonding phenol-formaldehyde glue Fortil. Characteristics, properties and use. Properties of the glue joint. Optimum conditions of use.**] *Prace Inst. Bad. Leśn.* No. 96, 1954. pp. 44 + 1. 12 refs. [Pol.russ.e.] Price *Zł.*5·80.

The glue, made in the laboratories of the Polish Forestry Research Institute, is a solution in acetone of a resin obtained from phenol and formaldehyde in the presence of an alkaline catalyst; its hardener is liquid and of acidic nature, its storage life 4–7 months and working life 1–3 hours. It is claimed to be resistant to both cold and boiling water, high temperature, lubricating oils, C_6H_6, and varnish. Instructions are given for obtaining good glue joints.

986. ENZENSBERGER, W. Maschinen zur Vorbereitung und zum Auftragen von Leimen. [**Machines for the preparation and application of glues.**] *Holz Roh- u. Werkstoff* 12 (4), 1954 (163–8). [G.g.] P.R.

Machines shown at the Hanover Fair, 1954.

987. PLATH, E. Neuere Untersuchungen über die Verleimung von Sperrholz. [**Recent research on the gluing of plywood.**] *Mitt. öst. Ges. Holzforsch.* 6 (3), 1954 (39–46). [G.] P.R.

Deals with the following subjects: mechanical application of glue; extenders for the urea-formaldehyde resins, and phenolic resins at temperatures below 100° C. The veneer-shear test (determination of the wet strength of veneer strips glued together so as to overlap one another) is described, and its merits discussed.

988. COLLINSON, H. A. **P.V.A. glues for the woodworking industry.** *Adhesives & Resins, London* 2 (7), 1954 (164–6). P.R.

Discusses the compounding, use, and properties of the polyvinyl acetate glues, and precautions to be taken when handling them.

989. **Chemical treatment of surfaces improves joints with certain wood and glues.** *Tech. Note U.S. For. Prod. Lab., Madison* No. 232 (rev.), 1953. pp. 4. P.R.

Two tables give the average joint strength and average wood failure for some 10 different species when treated with NaOH solution and glued under (1) good and starved-joint conditions, and (2) normal conditions.

990. ESTEP, M. H. **The use of urea resin glues in radio frequency lumber edge gluing.** *J. For. Prod. Res. Soc.* 4 (3), 1954 (138–42). 8 refs.

991. PETERSON, R. W. **Dielectric heating as applied to the woodworking industries.** *Bull. For. Br. Can.* No. 110, 1954. pp. 40.

Reports on work done at the Ottawa Laboratory and generally reviews present and possible uses of dielectric heating, particularly for gluing and seasoning of wood.

825. *Cleaving. Adzing. Mechanical Comminution*

See also Nos. 529, 1054.

992. TARASOV, I. A. Odnocepnoĭ kolun KC-5. **[The KC-5 single-chain log cleaver.]** *Lesn. Prom.* 13 (8), 1953 (14–6). [Russ.]

Billets up to ca. 120 cm. long and 60 cm. in diam. can be conveniently split, using the new stationary-wedge cleaver, having the following characteristics: total weight (with a 10-KW motor) 2380 kg., chain length 5 m., wedge angle 20–30°, wedge incline angle 8°.

993. **New waste-saving way to split oversize logs.** *Wood, Chicago* 59 (7), 1954 (26). P.R.

Brief description, with photographs, of a hydraulic-power log splitter, developing 65 tons pressure and cable of splitting 8-ft. logs up to 42 in. in diam.; and also of a 12-ft. ripsaw housed in a shed on 2 pontoons.

826. *Peeling. Slicing. Trimming, Edging etc. of Thin Sheets*

See also No. 971.

994. HYLER, J. E. **Dogging logs at the rotary.** *Veneers & Plyw.* 48 (7), 1954 (8 . . . 18). P.R.

Discusses different methods of hand-dogging and power-dogging of veneer bolts.

995. KIVIMAA, E., and KOVANEN, M. Vaneri-sorvin terien mikroteroituksesta. **[Microsharpening of veneer lathe knives.]** *Tied. Valt. tekn. Tutkimusl.* No. 126, 1953. pp. 24. 5 refs. [Fi.fi.e.] P.R.

Discusses the possibility of eliminating the microscopic fractures that tend to occur in the cutting edge, by following the grinding proper by a final sharpening, called microsharpening, to be applied only to the cutting edge. Test cutting of veneer from Birch showed that the appropriate microlip [sharpness] angle β [illustrated] should be about 27° and the width of the microbevel b, 0·1 to 0·2 mm. The side on which the knife was honed made no significant difference to veneer quality. This was found to depend on a number of factors, of which nosebar pressure alone has so far been studied. Best results were obtained with a nosebar pressure of 17·5%. [Illustrations and graphs have English legends.] *From authors' summary.*

827. *Bending. Moulding (other than by Cutting)*

See also No. 1042.

996. **The effect of immersion in hot water on the compression strain of English Oak.** *Rep. For. Prod. Res. Bd., Lond. 1953*, 1954 (17–8).

Stress/strain curves have been obtained for groups of matched Oak prisms tested in compression after immersion for 30 min. in water at various temperatures. The results show that compression strain is considerably increased by immersion in hot water and that the strains are greatest when the temperature of the water is 100° C. There is no significant difference in maximum stress for different groups of specimens. The strain, and also the stress, at proportional limit have been found to decrease as the water temperature is increased. Immersion in boiling water before bending can therefore be expected to produce more satisfactory bends than treatment at any lower temperature.

829.1. *Finishing*

See also No. 1104.

997. BLANKENSTEIN, C. Verfahren und Betriebsmittel der Oberflächenbehandlung im Holzmöbelbau. **[Methods and appliances for surface treatment in wood furniture manufacture.]** *Holz Roh- u. Werkstoff* 12 (4), 1954 (168–72). [G.g.] P.R.

Illustrated description of machines and tools shown at the Hanover Fair, 1954.

998. SANDERMANN, W., and DIETRICHS, H.-H. Untersuchungen über Holzkitte. **[Investigations on wood-filler compounds.]** *Holz Roh- u. Werkstoff* 12 (3), 1954 (98–104). 35 refs. [G.g.] P.R.

Presents the results of an investigation of 6 commercial compounds, of which only one gave satisfactory results in shrinkage, hardness, stainability and water-resistance tests. Tests on the dependence of the properties on composition showed that: (1) shrinkage is a function primarily of the content of the solid constituent, which, in turn, depends on the viscosity of the dissolved binder; (2) the drying time depends on the nature and boiling-point of the solvent and on the % of plasticizers and binders; (3) hardness and elasticity depend on the nature and quality of binders and plasticizers; (4) stainability

depends on fillers and binders, and (5) the finer the filler grains, the better the polishability.

999. DICKINSON, T. A. **Ceramic finishes for wood.** *Wood Wkg. Dig.* 56 (5), 1954 (121 . . . 126). P.R.

Describes the recently developed flame-spraying technique consisting in ejecting pneumatically a fine refractory powder through a hot gas flame; the particles are temporarily melted by the flame and are fused on untreated wood surfaces. Properties and application of such ceramic coatings are described.

1000. HALL, J. A. **Paper and wood—a new team.** *Repr.* from *Paper Industry, Mount Morris, Ill.* Feb., 1954 (1209–12). P.R.

Discusses the use of paper overlays on face veneers for (1) masking wood defects, (2) providing a paint-base, and (3) strengthening the plywood. The wear resistance and other properties of paper overlays are described.

83. TIMBER MANUFACTURING INDUSTRIES AND PRODUCTS. USES OF WOOD AS SUCH

1001. HOGG, A. L. **Advances in the utilization of Radiata Pine [in New Zealand].** *Aust. Timb. J.* 20 (4), 1954 (283 . . 299).

Discusses the development of its use, seasoning, preservative treatment and grading, and the use of different grades for building, boxes, veneer, plywood and coreboards, furniture and joinery, and miscellaneous uses.

831. *Fuelwood and Various Types of Rough Timber*

See also Nos. 813, 1056, 1084, 1088–95, 1098–9, 1110–2, 1173.

1002. DALE, I. R. **Fence posts.** *Tech. Note For. Dep. Uganda* No. 11/54, 1954. pp. 3.

Lists 19 durable Uganda species with their estimated average life.

1003. **Piles (eastern Australian hardwoods).** *Inter. Specif. Stand. Ass. Aust.* No. *SAA. Int.* 365, 1952. pp. 6. Price 2*s.* 6*d.* P.R.

1004. **Wooden poles for overhead telecommunication and power lines.** *Inter. Specif. Stand. Ass. Aust.* No. *SAA. Int.* 364, 1952. pp. 8. Price 2*s.* 6*d.* P.R.

1005. **Rail track sleepers, crossing or lead timbers and bridge transoms.** *Inter. Specif. Stand. Ass. Aust.* No. *SAA Int.* 367, 1953. pp. 10. Price 4*s.* P.R.

1006. **Timber ladders, steps and trestles.** *Brit. Stand.* No. 1129, 1954. pp. 29. Price 5*s.* P.R.

832. *Mills, Their Functions and Products*

832.1. Sawmills and Planing Mills

See also Nos. 509, 950 *et seq.*, 1155, 1171, 1177.

1007. GOTTLIEB, F. Der Kraftbedarf eines Sägewerkes. **[Power requirements of a sawmill.]** *Int. Holzmarkt* 43 (18; 20; 23/24; 25), 1952 (17–24; 14–5; 5-8; 5–6); 44 (4), 1953 (5–9). [G.]

Gives examples showing a method of calculating power requirements for sawmills using different types of saw and auxiliary equipment.

1008. SEROV, B. V. Èlektropnevmatičeskie mehanizmy na lesopiljnyh potokah. **[Electro-pneumatic machinery in the handling of timber in the sawmill.]** *Lesn. Prom.* 13 (1), 1953 (25–7). [Russ.]

The construction and operation of a Russian-made electro-pneumatic plant are illustrated and described. Having passed the test of practice successfully, it is being introduced into all frame-saw mills of the Kem forest undertaking of the Kareldrev 'Trust'.

1009. TELFORD, C. J. **Production performance of equipment used to saw small logs.** *Rep. U.S. For. Prod. Lab., Madison* No. 1971, 1954. pp. 10 + [2]. P.R.

Production data are presented for several types of mill used to convert small logs up to ca. 12 in. in diam. u.b., and their efficiencies are compared.

1010. ANDREWS, G. W. **Lumber and pickets: a comparison of recovery by two edging methods.** *Timber of Canada* 14 (4), 1954 (32 . . . 35). 9 refs.

In a study on 32 White Pine logs, boards were fed either at an angle, the edger saw travelling parallel to the bark on one side, or normally. The first method gives one very narrow edging and one large tapered one and the normal method two tapered edgings roughly equal in size. Greater accuracy of sawing was possible by the first method, and there was an increase in lumber production, production of pickets from the edgings being about the same for both methods.

1011. **[Yield of timber from *Pinus pinaster*.]** *Rep. For. Prod. Inst. Dep. For. S. Afr. 1952/53*, 1953 (5–6). P.R.

As part of an investigation into complaints of low yields from various areas, data for randomly selected stems of *P. pinaster* (Portuguese race), from which logs were prepared in the normal manner, are tabulated, including: log class, % total recovery of sawn unseasoned timber of 3 in. side and up, and % of sawn seasoned and graded timber as structural, reject structural, box, and reject box.

1012. SIMMONS, F. C. **Relating sawmill 'waste' to log quality.** *B.C. Lumberm.* 38 (7), 1954 (52 . . . 60). 4 refs. (Repr. from *Mech. Engng., N.Y.*)

Discusses the amounts of slabs, edgings and sawdust produced in relation to log size and amount of cull, and quotes some figures from different N. American sources on relation of log diameter to waste.

1013. GRANTHAM, J. B. **The relationship of lumber recovery to log quality in 29 old-growth Douglas-Fir trees of the Oregon Coast Range.** *Rep. Ore. For. Prod. Lab* No. *G*1, 1953. pp. 13 + 34 tbls. + 2 gphs. + 30 dgms.

A study was made of 115 logs. No particular conclusions are drawn, but diagrams are given showing the extent of decay in each log with tabulated figures of the lumber recovery from it, its lumber value and the pond value (obtained by subtracting the cost of sawmilling from the lumber value).

1014. CREIGHTON, J. W., JR. **The relationship between lumber quality and conversion cost in furniture plant rough mills.** *Abstr. of thesis,* in *Dissert.*

Abstr. 14 (7), 1954 (1011). [University of Michigan.] O.R.S.

Results of a study in 4 mills.

832.2 Veneer and Plywood Mills, including the Manufacture of Composite-Wood Assemblies

See also Nos. 812, 913, 980 *et seq.*, 994–5, 1000, 1033, 1204.

1015. Anderson, I. V. **Suitability of Rocky Mountain woods for veneer and plywood.** *J. For.* 52 (8), 1954 (587–91). 8 refs.

Gives details of the slicing, rotary peeling, drying and gluing behaviour of the species in commercial use (*Pinus ponderosa, Larix occidentalis, P. monticola, Picea engelmannii*) and others. The greatest possibilities probably lie in sliced veneers of *P. monticola* (knotty figure), *L. occidentalis* and Douglas Fir (ribbon-grain) and *P. engelmannii* (knotty panels). *From author's summary.*

1016. **Veneer cutting and drying properties. Engelmann Spruce.** *Rep. U.S. For. Prod. Lab., Madison* No. 1766–10, 1953. pp. 4 + 3 tbls. 4 refs. P.R.

1017. **Veneer cutting and drying properties. Tupelo.** *Rep. U.S. For. Prod. Lab., Madison* No. 1766–9, 1953. pp. 4 + 2 tbls. 4 refs. P.R.

1018. Fleischer, H. O. **Beech for veneer and plywood.** *Beech Utiliz. Ser. Ntheast. For. Exp. Sta.* No. 6, 1953. pp. 24. 15 refs.

Hardwood log-grading rules for No. 1 or veneer-grade logs can be used as a guide to selecting Beech [*Fagus grandifolia*] for veneer. Ten Beech logs were cut into veneer at Madison. It was found that logs can be properly prepared for rotary cutting by heating in water at 175° F., higher temperatures causing end-checking. Cutting and drying presented no special difficulties but tangential shrinkage was high. Yields were satisfactory. Some delamination of plywood joints occurred in severe interior exposure conditions, and the plywood developed more face-checking, grain-raising and warping than is usual with most hardwoods. Some uses of Beech veneer and plywood are discussed.

1019. Drei japanische Furnierhölzer. Tamo—Sen—Ahorn. [**Three Japanese veneer woods: *Fraxinus sieboldiana* and *F. mandshurica*, *Kalopanax ricinifolius*, and *Acer palmatum*.**] *Holz-Zbl.* 80 (103), 1954 (1219). 7 refs. [G.]

Information on commercial and local names, occurrence, the trees, wood, woodworking and use.

1020. [**Veneer species.**] *Rep. For. Res. W. Bengal 1951/52*, 1954 (18).

Hymenodictyon excelsum is suitable for inside, but not for face veneers. *Sonneratia apetala* sapwood peels easily and the heartwood peels after boiling. Veneer from this species has an agreeable appearance and high bending strength.

1021. Northcott, P. L. **Improved method for evaluating the quality of phenolic resin bonds of Douglas Fir.** *Abstr. of thesis*, in *For. Chron.* 30 (2), 1954 (232–3).

Compares a number of standard test methods and describes in detail the glueline-cleavage test, the principle of which is to split or cleave a 1-in.-square plywood specimen along the glueline by means of a 'knife' or wedge. It is believed to be the most accurate method yet developed.

1022. Knight, R. A. G., and Newall, R. J. **Seven and a half years of durability trials on adhesives in plywood.** *Wood* 19 (7), 1954 (287–90).

Analyses the behaviour over 7½ years of a range of adhesives used in Beech plywood exposed as follows: (1) stored in a normally-heated workshop; (2) exposed to the weather on racks facing south in an open field; (3) stored in an open-sided shed and momentarily dipped in water once a month; or (4) submerged in fresh (i.e. stagnant, but not salt) water in tanks standing in the open. In (1), Na silicate failed in 13 months, ureas extended with flour in excess of 50% are suspect, and other adhesives are without significant deterioration. In (2) only phenolic and resorcinol resins survive and these show slight deterioration. No tests in (3) were made on phenolic, resorcinol, melamine or fortified urea resins but there is no doubt of their durability; normal urea adhesives with or without up to 20% flour extender were satisfactory; casein and animal glues would probably have performed better but for the water dip; Na silicate failed in 7 months. In (4) all synthetic-resin adhesives, including ureas extended with up to 50% flour, showed negligible deterioration. Casein, animal and Na silicate glues were not tested as their water resistance is too low. A table is given showing the suitability of the different types of glue for use in the 4 environments.

1023. **Temperature penetration and moisture migration in plywood.** *Rep. For. Prod. Res. Bd., Lond. 1953*, 1954 (26–7).

Observed values for temperature rise within a 5-ft.-square plywood panel during heating, and of the moisture-content (m.c.) distribution after curing, are shown in graphs. The migration of moisture at platen temperatures round 145° C. appears to be closely related to blistering. This has been found to occur in veneer packs uniformly dried to a m.c. of as low as 8%. In a veneer pack the rate of warming usually slows considerably after 110° when moisture begins to boil off, but in some cases the observed rise was abnormally rapid, indicating that moisture was trapped in the veneers. This trapped moisture can exert a vapour pressure at the end of the warming period large enough to rupture the fibres when the press is opened. The effect seems to be confined to a few species and may also be associated with abnormally high compression in the press owing to the presence of 'brittle heart'. It is greater at high m.c.s, but is not entirely confined to the wet patches that are sometimes found in recently dried veneer.

1024. Shigesawa, S., and Kiwamura, J. [**The effects of veneer-tenderizing on warping of plywood.**] *Wood Ind., Tokyo* 9 (8), 1954 (372–4). 4 refs. [Jap.e.] P.R.

In tests on Beech plywood using a specially designed tenderizer [illustrated], tenderizing the core failed to prevent the panels from warping. Different

cutters in the tenderizer might be more effective. *From authors' summary.*

1025. Rao, K. R. **F.R.I.-diaper.** *Indian For.* 80 (7), 1954 (415–6 + 3 photos).

Describes a process developed at the Forest Research Institute, Dehra Dun, for making ornamental veneer for cabinet-making etc. Veneers of different colours (natural and artificial) are corrugated by shaping in identical moulds and glued together to form blocks which are then planed to smooth the corrugated faces. The blocks are then sliced along the grain to produce a patterned veneer.

832.3. Match Factories

1026. Die Pappel in der Zündholzindustrie. [**Poplar for match manufacture.**] *Int. Holzmarkt* 45 (2), 1954 (16–7). [G.]

Discusses the relative merits as regards chemical and mechanical properties and ease of manufacture of Spruce and different Poplar species.

833. *Timber in Buildings and Engineering Structures (Manufacture and Use)*

833.1. Building Components and Fittings: General

See also Nos. 910–2, 973–5, 979, 1155, 1178.

1027. **National Building Code of Canada, 1953. Part 4—Design. Section 4.3. Wood.** National Research Council, Ottawa. *NRC* No. 3194, 1953. pp. 40. P.R.

Deals with general design requirements, sawn timber, glued-laminated timber, plywood design, timber fasteners, frame and plank wall construction.

1028. **Heavy engineering structural timbers from eastern Australian hardwoods.** *Inter. Specif. Stand. Ass. Aust.* No. *SAA Int.* 366, 1953. pp. 11. Price 3*s.* P.R.

1029. Dünser, H. Die Bemessung der Holzbalkendecke. [**Calculations for timber beam ceilings.**] *Int. Holzmarkt* 44 (14), 1953 (8–10). [G.]

Includes a nomogram for calculating the cross-section and the spacing of the beams for different loads and areas to be covered.

1030. Kato, S., and Kamiisaka, M. **Wooden beams prestressed by eccentric tensioning.** *Trans. 61st Mtg. Jap. For. Soc.* 1952 (191–2). From *abstr.* in *Rec. Res. Fac. Agric. Univ. Tokyo* No. 3, 1954, (81–2). [E.]

Mechanical properties of two types of pre-stressed beam, one with a parallel tension wire and one with inclined tension wires and a central strut, were tested and compared with a simple beam under single concentrated vertical loadings. Results of bending tests are tabulated. The behaviour of the pre-stressed beams was found to be similar to that of fixed beams or continuous beams with both ends fixed. Their rigidity and strength were considerably higher than those of the simple beam.

1031. Stern, E. G. **Nailed trussed rafter of 24-ft. span and 3 in 12 pitch.** *Bulletin, Wood Research Laboratory, Virginia Polytechnic Institute, Blacksburg* No. 14, 1954. pp. 15. P.R.

1032. Lefkof, E. A. **Beech [*Fagus grandifolia*] for flooring.** *Beech Utiliz. Ser. Ntheast. For. Exp. Sta.* No. 8, 1953. pp. 11. 9 refs.

1033. **Veneered plywood panelling and central heating.** *Timb. Inform. Timb. Developm. Ass.* No. 43, [1954]. pp. 2. 4 refs.

Practical advice on installation, precautions and action if checks and splits occur in the face veneer.

833.2. Special Uses in Residential, Commercial and Public Buildings

1034. Guiscafré, J. Au Cameroun: habitations améliorées en bois. [**Improved wooden houses in the French Cameroons.**] *Bois For. Trop.* No. 36, 1954 (47–52). [F.f.e.span.]

Describes, with photographs and plan, a model bungalow, built with local timbers, by local labour, and costing about $\frac{3}{5}$ as much as a brick house.

833.3. Special Uses in Factories and Workplaces

See Nos. 1096, 1118, 1129–30.

834. *Shingles. Cooperage. Packing Containers. (Manufacture and Use.)*

See also Nos. 942, 960, 976, 1097, 1135.

1035. **List of publications on box and crate construction and packaging data.** *Rep. U.S. For. Prod. Lab., Madison* No. *R*791, 1954. pp. 17. P.R.

1036. Cook, D. B. **Beech [*Fagus grandifolia*] for containers.** *Beech Utiliz. Ser. Ntheast. For. Exp. Sta.* No. 7, 1953. pp. 13.

Discusses the manufacture of agricultural baskets and wire-bound boxes from Beech.

1037. **Fibreboard and composite drums.** *Brit. Stand.* No. 1596, 1953. pp. 13. Price 2*s.* 6*d.* P.R.

835. *Industrial and Domestic (Utility) Woodware. Toys and Models. Sports and Recreational Goods. Musical, Scientific and Mathematical Instruments. Surgical Applications etc.*

1038. Aaron, J. R. **Use of home-grown timber in wood-turning and related trades in Scotland in 1953.** *For. Rec. For. Comm., Lond.* No. 27, 1954. pp. 10 + 6 photos. 6 refs.

1039. Hale, W. H. **Some timbers used in pattern making.** *Timber Technol.* 62 (2178), 1954 (177–9). P.R.

The 3 species used at present for the construction of patterns, viz. *Pinus strobus*, *Swietenia macrophylla* and *Thuja plicata*, withstand relatively well the different conditions of service (high moisture content of the foundry sand, rough usage, repairs, storage). Some methods to prevent possible swelling or shrinkage are described. *Agathis australis* and *Araucaria angustifolia* are suggested as alternative materials. Experiments with varnished and unvarnished *Pinus strobus* patterns are described. To obviate the distortion in cross halving joints, the author recommends several measures, the chief being to keep the heartwood to the outside of the joint.

1040. **[Species for picker arms and shuttles.]** *Rep. For. Res. W. Bengal 1950/51*, 1953 (16).

Carapa moluccensis, *Betula cylindrostachys*, *Lagerstroemia parviflora*, and *Bucklandia populnea* were found suitable.

1041. **[Species suitable for umbrella manufacture.]** *Rep. For. Res. W. Bengal 1950/51*, 1953 (16).

Carapa moluccensis, *Bucklandia populnea*, *Betula cylindrostachys* and *Sonneratia apetala* were found suitable for umbrella handles and sticks.

1042. SAHAROV, M. D. Novoe oborudovanie dlja lyžnogo proizvodstva. **[New machines for the manufacture of skis.]** *Derev. lesohim. Prom.* 3 (7), 1954 (3–7). [Russ.] P.R.

Illustrated description of woodworking machines for manufacturing skis by a new process worked out by the CNIIMOD Institute: (1) a triple circular saw for breaking down logs; (2) LYS jointing bench; (3) LYF high-speed cutting machine; (4) LYSL polishing machine; (5) combination machine for the final shaping of skis; and (6) LYG vertical bending and seasoning machine.

836. *Furniture and Cabinet-Making. Carving. Marquetry. Wooden Ornaments*

1043. SAN MAUNG. **Furniture marts in Rangoon.** *Burmese For.* 3 (2), 1953 (67–78). 4 refs. [E.]

Abridgement of a thesis, dealing partly with the suitability of several Burmese timbers for furniture making.

838. *Vehicles (including Ships, Boats, Aircraft)*

1044. VENET, J. [1] L'emploi du bois dans la construction navale. La batellerie fluviale. [2] L'emploi du bois dans la fabrication des bateaux de pêche. [3] La charpenterie de marine dans les ports de pêche français. **[[1] Wood in naval construction. River craft. [2] Use of wood in the construction of fishing boats. [3] Boatbuilding in French fishing ports.]** *Rev. Bois Appl.* 9 (5;6; 7/8), 1954 (3–8; 49–52; 13–6). [F.]

1045. SAVORY, J. G. **Prevention of decay of wood in boats; with a contribution on electrochemical attack, by D. F. Packman.** *Bull. For. Prod. Res., Lond.* No. 31, 1954. pp. 18 + 8 plates. 12 refs. Price 2*s*.

Describes the fungi responsible for decay of timber in boats and the conditions in which they develop, and outlines methods for eradicating decay and preventing its development in new craft by the use of naturally durable timbers and modern wood preservatives. A section is devoted to the breakdown of wood by electrochemical attack. [Cf. *For. Abstr.* 15 (No. 704).] *From author's summary.*

839.8. *Industrial Waste Wood, its Processing and Uses*

See also Nos. 429, 1171, 1188–9, 1196 *et seq.*, 1215–6, 1221, 1225.

1046. **General recommendations regarding methods for wood waste utilization.** *Rep. U.S. For. Prod. Lab., Madison* No. 1666, 1953. pp. 2. P.R.

Discusses the utilization of waste as such and that involving conversion to some finished product.

1047. JONES, I. **Uses for woodwaste.** *Information Report, Technical Information Service, Furniture Development Council, London* No. 7 [*n.d.*]. pp. [6] + 25 + 17 + 15. 70 refs. P.R.

Includes sections on: raw wood as fuel; gas production; briquettes; carbonization; extractives; wood plastics; other chemical uses; chipboards; wood mouldings; wood flour; soil improvement; and building materials from woodwaste. The references are mostly in English.

1048. KLAGES, A. **Economic aspects of wood briquetting.** *Aust. Timb. J.* 19 (3), 1953 (174 . . . 187, 235).

Discusses the Pres-to-log and the Glomera briquetting machines and the cost of briquetting, value and output of briquettes and raw material needed.

1049. LETTS, W. **Fuel from forest waste.** *Report of the 13th Vermont Wood Products Conference, Northfield* 1953 (41–5). P.R.

Describes the manufacture and properties of 'Letts Burnettes' (briquettes made from sawdust and other waste without any added binder) with a heat value of 9000 B.Th.U./lb.

1050. ROTHER, B. Verhütung von Silobränden an einer Vorfeuerung für Holzspäne. **[Prevention of chip-hopper fires in a chip-fed furnace.]** *Holz-Zbl.* 80 (85), 1954 (1035). [G.]

In the chute between the furnace and the worm conveyor which feeds chips from the hopper, two mechanically operated valves are provided, which open and close alternately, thus always providing a tight shutter between the furnace and the hopper.

1051. ŠEREMETJEV, V. S. Topki skorostnogo gorenija dlja drevesnyh othodov. **[Furnaces for the rapid burning of wood waste.]** *Lesn. Prom.* 13 (8), 1953 (28–31). [Russ.russ.]

Illustrated description of the Pomerancev furnace. Wood waste with a moisture content of up to 60% is burned with success. Results of tests in 1952 of this and two other furnaces are tabulated; Pomerancev's furnace has a considerably higher heat efficiency.

1052. WINKELMANN, H. Mischfeuerungen für Holzabfälle und Torf. **[Combined furnaces for wood waste and peat.]** *BWK Brennstoff-Wärme-Kraft, Düsseldorf* 5 (2), 1953 (50–1). L.S.

Illustrated description of different types of furnaces in which wood waste can be burnt together with either peat or coal.

1053. MCKENZIE, W. M. **Project U.16—Waste prevention. Sub-project U.16–1—Sawdust utilization. Progress report No. 4. An investigation of the suitability of sawdust for packing grapes. (Second report.)** Division of Forest Products, C.S.I.R.O., Melbourne. 1954. pp. 22 + 12 photos. P.R.

[Cf. *For. Abstr.* 15 (No. 799).] Report on results obtained with circular-saw, band-resaw, and frame-saw sawdusts from *Pinus radiata*, *Eucalyptus regnans* and *E. marginata*, used for packing grapes for export and for cold storage. Circular-saw dust was found to be as good as cork. Winnowing of all

fine dust did not improve the separation of packing material from fruit. No marked difference in keeping qualities was observed between air-dried and kiln-dried material.

1054. **The use of wood chips in agriculture.** *Bull. Ntheast. Wood Utiliz. Coun.* No. 41, 1954. pp. 96. Many refs. P.R.

Report of a conference at Syracuse, N.Y., on 9 Oct. 1953. Includes the following articles: Wood chips and better farming (*A. C. McIntyre*); Wood chipping as a farm woodland enterprise (*R. V. Lea, L. S. Hamilton* and *J. Fedkiw*); Custom chipping (*W. Wollerton*); Operating experience—portable chipping (*T. C. Williams*); Woodchips in the southern tier (*R. A. Reed*); Operating experience with a portable chipper (*O. A. Schmidt*); Wood chips (and sawdust) as soil amendments (*H. A. Lunt*); The accumulation of soil organic matter from wood chips (*M. Salomon*); Effect of sawdust and sawdust leachate on the growth of rooted highbush blueberry cuttings (*L. C. Pratt* and *V. G. Shutak*); The use of wood fragments for mulch in apple orchards (*R. H. Lovejoy*); Wood chips for poultry litter (*J. A. Pino*); Wood chips for cattle bedding (*O. R. Boyd*); Handling and drying fragmented wood (*E. W. Foss*); and Bringing slash to a chipper (*A. Koroleff*). Besides literature references in most articles, an appendix gives a selected bibliography on the use of wood chips and wood chippers. Another appendix deals with the composting of sawdust.

1055. Wirtschaftlich-rationelle Zerkleinerung von Holzabfällen. **[Economic comminution of wood waste.]** *Int. Holzmarkt* 45 (1), 1954 (19–20). [G.]

Describes with an illustration and technical specifications a completely automatic machine incorporating a circular saw for cutting slabs and edgings to lengths ranging from 2·5 to 100 cm. Manufacturer: Fa. L. Steurer, Maschinenbau in Doren, Vorarlberg, Austria.

1056. Gorškov, D. S. Opyt pererabotki gorbylja v potoke špalopilenja. **[Experience with the processing of slabs during the sawing of sleepers.]** *Lesn. Prom.* 13 (11), 1953 (22–3). [Russ.]

Describes and illustrates practice in 2 Ural forest undertakings. The slabs are graded; large ones are sawn into 3 portions, the thickest central portion being converted on a multi-blade saw, and other portions processed separately. The final products include truck boards, planks and box boards.

84. PRESERVATION AND OTHER TREATMENTS TO IMPROVE THE PROPERTIES OF WOOD. DAMAGE BY BIOLOGICAL AGENCIES AND ITS CONTROL. SEASONING. TIMBERYARD PRACTICE

841. *Wood Preservation*

See also Nos. 823, 1001, 1045, 1123, 1131–2, 1146.

1057. Liese, J. Holzschutz. **[Wood preservation.]** VEB Verlag Technik, Berlin. 1954. pp. 140. 24 refs. [G.] X.

A manual for practical workers. Includes sections on: wood, its structure and properties; fungal decay; attack by animal pests; preservation (natural immunity, optimum physical conditions, chemical preservatives); methods of preservation; after-treatment; and wood preservation in buildings.

1058. **The B.W.P.A. convention: extracts from some papers read at the British Wood Preserving Association's convention at Cambridge, last month [June] 1954.** *Wood* 19 (7), 1954 (295–8).

Covers papers on: Timber extractives (*Sir J. L. Simonsen*); An architect's views on the uses of timber and its preservation (*C. S. White*); Solvent-type preservatives (*I. Hatfield*); Research on longhorned timber beetles and its relationship to timber preservation (*E. A. J. Duffy*); Physiology of wood-destroying fungi (*W. P. K. Findlay*); Requirements and variations in pressure treatment (*E. H. Nevard*).

1059. Steiniger, F. Wodurch könnte der Schutz des verbauten Holzes gegen Pilze und Insekten im Bundesgebiet erfolgreicher und ungefährlicher gestaltet werden? **[What could contribute to the better and safer protection of timber in buildings against fungi and insects in West Germany?]** *Desinfektion und Gesundheitswesen, Staufen i. Br.* 46 (5), 1954 (74–7). [G.] P.R.

Advocates a compulsory indication of the chemical composition of fungicides and insecticides by manufacturers, in order to give the consumer full information regarding the efficacity of the agent and its toxicity to humans and animals. Preservation of timber in buildings should be entrusted only to qualified specialists, and the work done should be recorded on a metal label. The problems of guarantees and certificates are also discussed.

1060. Haikonen, M. Om impregnerade trävarors giftighet för husdjuren. **[The toxicity of impregnated wood for domestic animals.]** *Repr.* from *Nordisk Veterinærmedicin, København* 6, 1954 (533–46). 24 refs. [Sw.sw.e.g.] P.R.

The solubility of the various components of the preservatives (Wolman and Boliden salts, Celcure and Lahontuho, a preservative containing As_2O_5) was examined in Finland by extracting chips from the surface of the impregnated wood (Pine) with cattle saliva and analysing the extracts for their content of poisonous ingredients. The toxicity of the components was determined and the lethal doses are tabulated. From these, the 'lethal surface areas' of impregnated wood are calculated for the different preservatives.

1061. Hicock, H. W., and Olson, A. R. **The toxicity to plants of wood preservatives and their solvents.** *Circ. Conn. agric. Exp. Sta.* No. 189, 1954. pp. 4.

Studies were made to determine the toxicity to plants of certain of the materials used to protect wood from decay and insect attack. The work was confined to the response of tobacco plants growing near treated wooden posts under a shade tent where air circulation is somewhat retarded, and the response of certain other plants to exposure to wood-treating chemicals under greenhouse conditions where the circulation of air is often severely retarded. The authors conclude that pentachlorophenol should never be used in close proximity to growing plants in greenhouses or cold frames. Of the numerous materials tested as solvents for pentachlorophenol or

Cu naphthenate, none can be used near plants with entire safety, and though Cu naphthenate itself is apparently not injurious to plants, there is no ready means known at present for introducing it into wood except in solvents that are toxic. [Cf. *For. Abstr.* 11 (No. 261).]

1062. DUNCAN, C. G. **Soil-block and agar-block techniques for evaluation of oil-type wood preservatives: creosote, copper naphthenate and pentachlorophenol.** *For. Path. spec. Release U.S. Bur. Pl. Ind.* No. 37, 1953. pp. 39. 53 refs.

The soil-culture technique was found to have certain advantages (discussed in detail) over the use of malt agar. [Cf. *For. Abstr.* 15 (No. 804).]

1063. HEIKS, R. E., BLUM, S. E., and BURCH, J. E. **Toxicity of β, β'-oxydipropionitrile soluble and insoluble fractions of creosote and petroleum oils to wood-destroying fungi by the soil-block method.** *J. For. Prod. Res. Soc.* 4 (3), 1954 (123–6). 6 refs. [Battelle Memorial Institute, Columbus, Ohio.]

The soluble fraction was found in soil-block tests to be much more toxic to *Lentinus lepideus* than the insoluble fraction or the complete oil, whether this was of coal-tar or petroleum origin.

1064. ZUBIETA, G. J., GOMEZ, C. E., and BERNARDI, A. E. Valoración tóxica comparativa de algunos preservadores de madera. **[Evaluation of the comparative toxicity of some wood preservatives.]** *Industria y Química, Buenos Aires* 15 (2/3; 4), 1953 (54–6; 106–11). 70 refs. [Span.] L.S.

Three preservatives (creosote, Tanalith and Wolmanite) were tested by a modified Leutritz method on specimens of *Copernicia alba*, using *Polystictus sanguineus* as test fungus. The following useful modifications were made in the standard test method: (1) pH of soil in the test flasks was regulated by the addition of nutrient solutions; (2) specimens were moistened with water before being enclosed in the flasks; this can be done at the same time as their sterilization if a steam method is used; (3) a series of impregnated specimens was subjected to weathering (either real or laboratory-produced) before testing; and (4) with creosoted specimens, controls were kept in sterile flasks to check on loss of weight through 'bleeding'. In general, 'unweathered' specimens lost less weight than weathered ones, possibly because of a greater retention of preservatives in the external zone. When loss of weight was calculated as a function of net retention of preservative, results were uniformly good for creosote and Tanalith without weathering but were superior for creosote with weathering. In these tests Wolmanite proved generally inferior to Tanalith.

1065. **Coal tar creosote for the preservation of timber.** *Brit. Stand.* No. 144, 1954. pp. 17. Price 3*s*. P.R.

1066. TEIGSTAD, J., and WINJE, G. Middel til impregnering og bestryking av trevirke, særlig trefartøyer som båter samt framgangsmåte til dets framstilling. **[Substance for impregnation and surface treatment of wood, especially wooden vessels, such as boats, and method of preparing it.]** *Norwegian Patent* No. 79,671, Feb. 4, 1952. pp. 2. [Nor.] P.O.

The preservative consists of (1) a wood tar, free from pitch, (2) aliphatic hydrocarbon or hydrocarbon mixtures, preferably white spirit, as a thinner, and (3) a drying oil, preferably linseed oil, in approximately equal quantities.

1067. GESELLSCHAFT FÜR HOLZIMPRÄGNIERUNG UND HOLZVERWERTUNG M.B.H. Holzimprägnierungsmittel und Verfahren zu seiner Herstellung. **[Wood impregnant and method of preparing it.]** *Austrian Patent* No. 177,559, Feb. 10, 1954. pp. 1. [G.] P.O.

The impregnant, consisting of a mixture of $ZnCl_2$ (and other easily soluble salts of metals) with alkali metal chromates and/or nitro compounds, preferably with wetting agents, and containing 50–70% $ZnCl_2$, is obtained by dissolving the constituents in water at 50–80° C. and mixing these solutions at the same temperature.

1068. GUITON, J. R. Produit destiné à la conservation des bois. **[Wood preservative.]** *French Patent* No. 1,046,062, Dec. 3, 1953. pp. 2. [F.] P.O.

Consists substantially of NH_4HF_2 or KHF_2, with an NH_4 phosphate, the latter, preferably, in a proportion lower than that required for a complete neutralization of the bifluoride.

1069. KOKOSCHINSKI, A. (to Chemische Werke Albert). Schützen von Holz durch wasserlösliche Siliciumfluoride. **[Wood preservation by means of water-soluble silicofluorides.]** *German Patent* No. 878,839, June 8, 1953. pp. 2. [G.] P.O.

Wood impregnated with ca. 5–10% aqueous solutions of silicofluorides is heated for at least 1 hour to over 40° C.

1070. GÖTTE, E. (to Deutsches Hydrierwerk Rodleben VEB). Holzkonservierungsmittel. **[Wood preservatives.]** *German Patent* [*East Germany*] No. 355, March 5, 1952. [G.] From *abstr.* in *Chem. Zbl.* 124 (47), 1953 (8241). [G.] L.S.

The preservative consists of cation-active compounds, with or without known fungicides and insecticides, and extenders, diluents etc. The cation-active compounds are surface-active alkyl derivatives which form during hydrolysis alkyl-containing cations. Examples of such preservatives are dodecylpyrimidinium chloride, and dodecyloxycarbomethyltrimethylammonium chloride. Describes in detail a solution of 5 parts of dodecylbenzyldimethylammonium silicofluoride and 3 parts of alkyl (C_{10}–C_{16}) pyridine hydrochloride. The preservatives are used for preserving timber in buildings, mostly by coating.

1071. WALKER, H. G. (to Pennsylvania Salt Mfg. Co.). **Wood preservation with dimethyl tetrachlorophthalate.** *U.S. Patent* No. 2,650,893, Sept. 1, 1953. pp. 1. 2 refs. P.O.

The chemical is first dissolved in small amounts of an organic solvent (e.g. xylene) and the solution added to the water carrier, with or without emulsifying and wetting agents. After impregnation, the wood is dried. Samples of wood immersed for ca. 10 min. in 0·05% solutions showed no attack by termites after a period of over 1½ years.

1072. ERLENBACH, M., and STIEGLITZ, A. Agents de protection du bois contre l'attaque par les champignons parasitaires et les animaux nuisibles. **[Wood preservatives against fungi and animal pests.]** *French Patent* No. 1,013,354, July 28, 1952. pp. 2. [F.] P.O.

Wood is impregnated, also under pressure, with aqueous solutions of β-naphtholates of alkali metals; free insoluble β-naphthol, β-dinaphthol or β.β-dinaphthylene oxide are formed after impregnation under the action of air (particularly CO_2).

1073. ABEL, G. E. (to VVB Alkali). Holzschutzmittel. **[Wood preservatives.]** *German Patent [East Germany]* No. 875, Aug. 16, 1952. [G.] From *abstr.* in *Chem. Zbl.* 124 (28), 1953 (4466). [G.] L.S.

Halogenated (Cl or Br) nitrophenol-sulphonic acids or their salts, with or without alkali dichromates, Zn or Cu salts, Na_3AsO_4 or $ZnSiF_6$, can be used as wood preservatives (or with phosphates, bromides or borates, as fire retardants). The preservatives can be applied by pressure, open-tank, spray, osmose or injection method.

1074. BIELER, N. Perfectionnements apportés à des procédés et à des moyens servant à la destruction des parasites, notamment en vue de la conservation du bois. **[Improvements in fungicides and insecticides, especially for wood preservation.]** *French Patent* No. 999,872, Feb. 5, 1952. pp. 2. [F.] P.O.

Involves the use of chlorinated naphthalenes, hydrogenated naphthalenes, naphthylamines or combinations of these substances, with or without other fungicides and insecticides. Coating, injecting, and open-tank methods can be used.

1075. FARBENFABRIKEN BAYER. Produits pour la préservation du bois. **[Wood preservatives.]** *French Patent* No. 1,048,175, Dec. 21, 1953. pp. 2. [F.] P.O.

Products of chlorination of diphenyl containing chlorinated aliphatic hydrocarbons with 5–20 C atoms and a Cl content of 10–70%, and having a consistency between a very viscous liquid and a soft resin.

1076. HEISEL, P., MÜLLER, E., and LECH-CHEMIE GERSTHOFEN. **Method of preserving wood.** *Brit. Patent* No. 680,935, Oct. 15, 1952. pp. 2. P.O.

Wood is deeply impregnated by any of the known methods with a chlorinated saturated aliphatic hydrocarbon which is in the form of an oil at room temperature, contains 10–20 C atoms and has a Cl content of 30–60%, or with a mixture of such chlorinated hydrocarbons.

1077. UMBACH, H. (to Henkel & Cie. G.m.b.H.) Mittel zum Imprägnieren von Holz und anderen Werkstoffen. **[Impregnants for wood and other materials.]** *German Patent* No. 878,840, June 8, 1953. pp. 2. [G.] P.O.

Aqueous solutions of distillation residues obtained during the manufacture of glycerol by the fermentation method.

1078. TEWARI, M. C., and PANDE, J. N. **Testing of wood preservatives. Part II. Boliden salts.** *Indian For.* 80 (8), 1954 (480–5). 6 refs.

The most recent formulation of Boliden salts (S25 containing As, Cu, Zn, and Cr) was subjected to leaching, corrosion, and graveyard tests on Sal (*Shorea robusta*) and Chir (*Pinus longifolia*) under Indian conditions. In the case of Chir, Cu was almost completely fixed; 5–7% of Cr was leached out under all conditions; 1·3–1·81% of As was leached out when a 6·035% solution was used, but it was almost completely fixed when the concentration of the treating solution was reduced to 3·017%; 15–20% of Zn was leached out at the lower concentration. Results with Sal were somewhat different: both Cu and Cr were completely fixed under all conditions of leaching; 3–7% As was leached out after one week in both concentrations; ca. 41·38% of Zn was leached out at the lower concentration. Corrosion tests were satisfactory and preliminary results of graveyard tests (1 year) were also promising. [Cf. *For. Abstr.* 14 (No. 1635).]

1079. VICKLUND, R. E., MANOWITZ, M., and BAGDON, V. J. **Mechanism of action of Cu 8-quinolinolate.** *Mycologia* 46 (2), 1954 (133–42). 13 refs. P.R.

It is suggested that molecules of this Cu salt must first dissociate to form Cu ions and 8-hydroxyquinoline, each of which performs different but related functions. The latter inhibits the growth of fungi by precipitating those metals which are essential for their metabolism. Cu ions function synergistically with the 8-hydroxyquinoline.

1080. WILSON, S. J., KNEALE, R. E., and TAMBLYN, N. **Project P.9—Properties of wood preservatives. Sub-project P.9-4—Tests of metallic naphthenates prepared from different naphthenic acids for use as wood preservatives. Progress report No. 4. Fractionation of naphthenic acids and toxicity of the fractions to wood-destroying fungi before and after conversion to copper naphthenate.** Division of Forest Products, C.S.I.R.O., Melbourne. 1953. pp. 18 + 1 dgm. + 8 gphs. 5 refs. Limited distribution. P.R.

It was found that the toxicity of each acid fraction is indicated by its acid value, the low-boiling (high-acid-value) acids being more toxic than the high-boiling ones. The Cu salts of the low-boiling fractions were the most toxic.

1081. OFFICE NATIONAL D'ÉTUDES ET DE RECHERCHES AÉRONAUTIQUES. Procédé d'imprégnation de matériaux fibreux. **[Method of impregnating fibrous materials.]** *French Patent* No. 1,009,741, June 3, 1952. pp. 4. [F.] P.O.

The fibrous material is first treated with a liquid which wets or swells it and is capable of dissolving, at least for some time, the impregnant, after which the treated material is exposed to the action of the solid or liquid impregnant.

1082. **Pressure creosoting of timber.** *Brit. Stand.* No. 913, 1954. pp. 15. Price 2*s.* 6*d.* P.R.

1083. HENRIKSSON, S. T. Holztränkung nach der Wechseldruckmethode. **[Wood impregnation by the method of alternating pressure.]** *Holz Roh- u. Werkstoff* 12 (6), 1954 (233–41). 17 refs. [G.g.] P.R.

A description with an abridged mathematical treatment is presented for the author's hypothesis of the mechanism of wood impregnation under a pressure/vacuum cycle. It is claimed that, when a barked log is impregnated in a pressure chamber with an aqueous solution, the liquid forces its way through rays and thence through bordered pits into tracheids. This process comes to a standstill when the increasing counter-pressure of air contained in the wood causes the pit membranes to close the pits. The next stage is to open the pits by applying a moderate vacuum to the log, after which the whole process is recommenced. The author discusses the following magnitudes: the distribution coefficient (the duration-of-the-pressure-phase/duration-of-one-cycle ratio), the duration of one cycle, the depth of penetration, and the total period of impregnation, and derives mathematical and graphical relationships between them. It is found theoretically that the 3 magnitudes mentioned first increase with the time of impregnation. A semi-industrial plant for effecting impregnations of this kind is described in detail and represented schematically. Experimental results showed a good agreement with theory, viz. that the distribution coefficient should be $> 30\%$ and that the most favourable cycle durations lie between 0·5 and 10 min.; after impregnation, the entire sapwood is solution-filled. Some woods (e.g. Spruce) must have a moisture content $> 25\%$ before impregnation, but no wood should be completely water-saturated before impregnation, as air is required to start the up-and-down cycle. The pressure applied in tests was ca. 9 atm., the negative pressure (vacuum) 0·08 atm., and the total impregnation period 20 hours, corresponding roughly to 800 cycles. The preservative used was an aqueous solution of a Boliden salt (CrO_3, ZnO or CuO, As_2O_5). It is assumed that different chemical reactions take place between the Zn (Cu) cations, and chromate and arsenate ions, on the one hand and the wood substance on the other, and the results of these reactions affect preservative penetration. It seems that the main reactions involved are absorption reactions between the acids and bases of the solutions and the hydroxyl and carboxyl groups of the wood substance. To ensure good penetration these reactions should be controlled, to which end the temperature of the impregnation system should be held to 20–30° C., and the As_2O_5 content not exceed 5 g./litre.

1084. GRAHAM, R. D. **The pressure treatment of Western Larch pole sections with pentachlorophenol solutions.** *J. For. Prod. Res. Soc.* 4 (3), 1954 (126–30). 2 refs. [Oregon Forest Products Laboratory, Corvallis.]

Ten-ft. Western Larch pole sections were treated virtually to refusal with 3 pentachlorophenol solutions. An average total retention of 8·5 lb. and a sapwood (s.w.) retention of 22 lb./cu. ft. (solution) and 0·98 lb./cu. ft. (solid) pentachlorophenol were obtained. Retention was highest near the surface, decreasing with depth. Complete s.w. penetration was obtained in poles having s.w. thickness ranging from 0·5 to 1·05 in., with retentions of 8–34 lb. There was virtually no radial penetration into the heartwood. All pole surfaces were clear at the end of treatment and there was no subsequent bleeding. A s.w. retention of 16 lb. is suggested as desirable, with total retentions of 4 and 6 lb. for large and small poles respectively and a minimum s.w. penetration of 0·4 in. and 90% [of volume?].

1085. AMEMIYA, S. **[Preservation of wood by the diffusion method. (1) Penetration tests with a few preservatives.]** *Wood Ind., Tokyo* 9 (7), 1954 (323–6). 6 refs. [Jap.e.] P.R.

Tests were made on diffusion into sapwood of *Cryptomeria japonica*, Nara (*Quercus* sp.) and Matsu, of Wolman salts and Na pentachlorophenate. Results were as follows: (1) The NaF in the Wolman salts penetrated from the outer edge through the sapwood to the boundary between sapwood and heartwood in all species within 2 months. (2) The dinitrophenol in the Wolman salts and the Na pentachlorophenate penetrated only a short distance (3–6 mm.) in 2 months. The results suggest that the process may be of practical use for preserving Japanese woods. *From author's summary.*

1086. SCHEFFER, T. C., and BROWNE, F. L. **Tests of some superficial treatments of exposed wood surfaces for their protection against fungus attack.** *J. For. Prod. Res. Soc.* 4 (3), 1954 (131–2). [U.S. Forest Products Laboratory, Madison, Wis.]

Results of tests on wood treated with preservative (P), sealer (S) or water repellent (R), or combinations of the 3, and exposed to fungus attack, buried in damp soil, or kept at high humidity in the laboratory, are tabulated. The following results were obtained: (1) S alone or in the combinations P + S, or RP (water repellent and preservative) + S gave little protection; (2) RP gave good protection and was more effective than P alone; (3) treatment with S was improved by incorporation of a preservative (PS); this was comparable with RP; (4) maximum protection was given by the combinations RP + PS or P + PS; the latter gave almost complete protection and was rather better than RP + PS, for some reason not clear in view of the superiority of RP to P.

1087. WALTERS, C. S., and MEEK, W. L. **Superficial treatment of duck boards not economical.** *For. Note Ill. agric. Exp. Sta.* No. 47, 1954. pp. 2.

Duckboards were treated by brushing or quick dipping with a number of preservatives, placed on crushed-rock paths between greenhouse benches, and observed for 5 years. Temperatures were 72–94° F. and humidity 31–75%. These superficial treatments did not give adequate protection against decay and termites. Adequate treatment should give sufficient penetration to permit some mechanical wear without exposure of untreated wood.

1088. DUNKELBERG, G. H. **The preservation of fence posts with water-soluble salts.** *Bulletin of the South Carolina Agricultural Experiment Station, Clemson* No. 409, 1954. pp. 46.

The average life of 6 species of Pine common in S. Carolina is a little over $1\frac{1}{2}$ years when used as untreated fenceposts; treating some of these species with $ZnCl_2$ by end-diffusion increases the average life to more than 10 years. Posts treated with $ZnCl_2$ have a longer average service life than those

treated with $CuSO_4$, which has the further disadvantage of corroding metal fasteners, wire etc., so that its use is not recommended as a preservative for fenceposts. Posts should be treated within 2 weeks of cutting, and cured for at least 60 days in a vertical position, butt upwards, to ensure proper distribution of salts. Service life is lengthened if posts are treated at both ends. Small posts take up treating solutions faster per sq. m. of cross-section than do large posts. It is not necessary to remove bark in order to secure satisfactory results.

1089. HICOCK, H. W., and OLSON, A. R. **Preservation of wood by simple methods.** *Bull. Conn. agric. Exp. Sta.* No. 581, 1954. pp. 66. 20 refs.

Reviews work done at the station over a number of years on the treatment of fence posts by several processes: open tank using coal-tar creosote; cold soaking with oil-soluble pentachlorophenol or Cu naphthenate; and several sap-stream processes for treating green, unpeeled posts and poles with $ZnCl_2$.

1090. SARLES, R. L. **Progress report: 1944 post service life tests.** *For. Mimeo. Ohio agric. Exp. Sta.* No. 11, 1953. pp. 3 + plate.

Full-length preservative treatment is necessary for all species tested (Shortleaf Pine, American Elm, Soft Maple). Both creosote and Cu naphthenate gave excellent results when applied by pressure or hot-and-cold bath treatment. A 15-second dip treatment was inadequate.

1091. SARLES, R. L. **Progress report: 1945 post service life test on Red Pine (*Pinus resinosa*).** *For. Mimeo. Ohio agric. Exp. Sta.* No. 15, 1954. pp. 2.

After 8 years, all posts treated with Cu naphthenate, however applied, were still sound. Untreated controls had all failed.

1092. SUOLAHTI, O. **Effect of barking and storage time on the impregnability of poles.** *Finnish Paper and Timber, Helsinki* 5 (1), 1954 (8–9). [E.]

A fairly full abstract in English of a Finnish article [see *For. Abstr.* 15 (No. 1943)].

1093. PAULI, O. Auswaschbarkeit, Imprägnierverfahren und Eindringtiefe als Faktoren der Masten-Standdauer. **[Leachability, method of impregnation, and depth of penetration as factors in the service life of poles.]** *Elektrizitätswirtschaft, Göttingen* 50 (3), 1951 (62–5). 9 refs. [G.] L.S.

The leachability (or the threshold toxic value following leaching) is often not sufficient for evaluating the longevity of impregnated poles. A major factor is the magnitude and uniformity of the depth of penetration. In this respect $HgCl_2$, with its low penetration value, is not as good as coal-tar oil, or the new UA salts (NaF, $K_2Cr_2O_7$, Na_2HAsO_4, dinitrophenol). Spruce poles show a very uneven depth of penetration, even under pressure. German official statistics (1900–32) give the following average life expectation for poles: (1) coal-tar oil, 60–90 kg./cu.m., Rüping method, 33·4 years; (2) $HgCl_2$, Kyan method, open-tank, 26·8 years; (3) Basilit (89% NaF + 11% dinitrophenol), for Pine (2·25 kg./cu.m.) 16 years, and for Spruce (1·6–2 kg./cu.m.) 12 years.

1094. SCHUCH, K. Chemische Untersuchungen an alten 'Kupfervitriolstangen'. **[Chemical investigation of old poles impregnated with $CuSO_4$.]** *Holz Roh- u. Werkstoff* 12 (3), 1954 (91–5). 12 refs. [G.g.] P.R.

The chemical analysis of 2 discarded telephone poles impregnated 50 years ago with $CuSO_4$ by the Boucherie method showed that the wood contained 3 and 3·8 kg. $CuSO_4 \cdot 5H_2O$/cu.m. at ground level and 4 and 4·6 kg. above that level.

1095. BEESLEY, J. **Sub-project P.6–3—Tests of pole treatments in Victoria, using *Eucalyptus obliqua* poles. Progress report No. 17. Report of 1951 inspection and retreatments.** Division of Forest Products, C.S.I.R.O., South Melbourne. 1953. pp. 19 + vi + ii + 28 photos. P.R.

After 18–19 years of exposure, creosote oil applied as an open-tank butt treatment or by pressure impregnation was found to afford the best protection to the sapwood of the treated poles. The heartwood of poles with sapwood removed, received satisfactory protection by oxyacetylene charring and creosote-oil spray, and by collar treatment with As_2O_3 with or without NaF.

1096. BESCHER, R. H. **Treating cooling-tower lumber to reduce fungal decay.** *Oil and Gas Journal, Tulsa, Okla.* 52 (36), 1954 (82–3). 8 refs. P.O.

A brief survey of the problem. The use of pressure-creosoted wood for cooling-tower construction is recommended. [Cf. *For. Abstr.* 16 (No. 1130).]

1097. ALBRECHT. F. (to 'Allemann' Zündwarenfabriken A.G.). Verfahren zur Erleichterung der Verarbeitung von Holz zu Körben und Kisten. **[Method of improving the production of wooden baskets and crates.]** *German Patent* No. 812,113, Aug. 27, 1951. pp. 2. [G.] P.O.

Spraying or dip-treating of wood with various antifungal solutions non-toxic to humans, such as: solution of cattle salt or table salt (1/10); tannic acid (1%); $NaNO_3$ (1/30); $Ba(OH)_2$ and/or $ZnCl_2 \cdot 2NH_4Cl$ and/or Cr alum; and waterglass (500 g./cu.m. wood), with or without Zn salts, slaked lime, and/or $CaCl_2$.

1098. JOHNSON, L. H. **Timber preservation for *Pinus radiata* hives.** *N.Z. J. Agric.* 88 (2), 1954 (105 . . . 109). A.P.B.

Describes suitable preservatives (i.e. water-soluble inorganic salts and oil-soluble preservatives) and methods of treatment, including home treatment by dipping.

1099. WALTERS, C. S. **A uniform service test for fence posts.** *J. For.* 52 (7), 1954 (527). 4 refs.

In preservative test inspections a 'moderate push' or a fixed-spring-balance pull are liable to accelerate weakening, which may be desirable but must be uniform. Stress (100 lb./sq. in. standard, assumed) equals $Mc/\frac{\pi r^4}{4}$ where M = bending moment [post height × load]; $c = \frac{1}{2}$ diam. or width and r = post radius. A table to show the loads applied at the post top to produce the 100-lb. stress for posts 2, $2\frac{1}{2}$ . . . 6 in. diam. and 3, 3·5 and 4 ft. post heights is given.

842. *Treatments to Improve the Resistance of Wood to Physical and Chemical Agencies other than Fire*

1100. Lissner, O., Graf, F., and Toepel, T. (to Badische Anilin- & Soda-Fabrik). Förfarande för förädling av trä genom impregnering med härdbara konsthartser. **[Method of improving wood by impregnation with hardenable synthetic resins.]** *Swedish Patent* No. 135,476, April 29, 1952. pp. 3. [Sw.] P.O.

The condensation products of polyvalent urethanes and formaldehyde are used as impregnants.

1101. Schwabe, K. Vergüten von Holz. **[Improved wood.]** *German Patent* [*East Germany*] No. 821, May 8, 1952. [G.] From *abstr.* in *Chem. Zbl.* 124 (28), 1953 (4465–6). [G.] L.S.

Thiocyanate groups are added to wood by chemical or electrochemical methods, the amount of CNS incorporated into wood being up to 25%. The mechanical properties of wood are improved by this addition, its swelling is markedly reduced, and its resistance to chemicals, fungi, and insects increased.

1102. Narayanamurti, D., and Grover, P. N. Harn-Holzstoff-Phosphat [*sic*]. **[Wood-urea-phosphate.]** *Papier, Darmstadt* 7 (21/22), 1953 (426–9). 13 refs. [G.g.] L.S.

Mangifera indica and *Bombax malabaricum* were treated with mixtures of urea and $(NH_4)_2HPO_4$. The retention of urea phosphate formed was good when the urea/$(NH_4)_2HPO_4$ ratio was $\geqslant 2{\cdot}2$; the modulus of elasticity was not affected by the treatment. Treated specimens not subjected to leaching with water had poorer gluing properties but more fire-resistance than those leached out.

1103. Narayanamurti, D., and Handa, B. K. Acetyliertes Holz. **[Acetylated wood.]** *Papier, Darmstadt* 7 (5/6), 1953 (87–92). 6 refs. [G.g.] L.S.

The effect of acetylation and methylation on the properties of some Indian woods and Bamboo was investigated. In addition to conventional methods, acetic anhydride in creosote oil was used for acetylation with satisfactory results. Dimensional stability was increased, bending elasticity slightly lowered, and resistance to decay by micro-organisms greatly enhanced.

1104. Heebink, B. G. **Dimensional stabilizing effect of paper overlays when applied to lumber.** *J. For. Prod. Res. Soc.* 4 (3), 1954 (149–51). [U.S. Forest Products Laboratory, Madison.]

Limited tests indicate that resin-impregnated paper overlays may reduce dimensional changes.

843. *Fireproofing and Fire Resistance*

See also Nos. 823, 885, 1073.

1105. Göhre, K., and Gillwald, D. W. Untersuchungen über die Feuerschutz-Imprägnierung von Holz im Vakuum-Druckverfahren und über die Prüfung der Wirksamkeit von Verfahren and Schutzmitteln durch Brennversuche. **[Researches on the fireproofing of wood by the vacuum-pressure process and on the testing of the effectiveness of the process and the substances by combustion trials.]** *Arch. Forstw.* 2 (2/3), 1953 (209–31). 13 refs. [G.g.]

Using a fireproofing mixture containing 60% $(NH_4)_2SO_4$, 15 each of $NH_4H_2PO_4$ and NH_4Br and 5 each of NaF (fungicide) plus Nekal (wetting agent), made up as a 10% solution, the best absorption took place in the vacuum-pressure process when pressure was raised in a series of steps. Heartwood and tylosed timbers required 40 atmospheres. Impregnated timber requires 1·7 to 2·5 times the drying period required by unimpregnated timber. A small fire balance, carrying in one pan an incineration basket on whose contents a 30 mm. bunsen flame plays, was used and for larger pieces the DIN4102 (lath tester). Graphs and tables show the progress of impregnation and the amounts absorbed by Beech, Pine, Spruce, Ash and Sycamore Maple; also the time-lapse and absorption by plywood in straight soaking. The loss of weight, temperature reached, rate of combustion in 20 minutes (the burner being removed after 15 minutes) are also detailed.

1106. **Fire-retardant paints containing borax.** *Tech. Note U.S. For. Prod. Lab., Madison* No. 249 (rev.) 1952. pp. 3. P.R.

Cf. *For. Abstr.* 3 (p. 232).

1107. Pyrotron Development Corporation. **Fire-retardant compositions, processes for their preparation, and coatings obtained by the application of such compositions.** *Indian Patent* No. 43,061, July 28, 1951. pp. 3. P.O.

The main ingredient of the compositions claimed for is phenol-sulphonate of urea. The resulting coating is claimed to be both a fire-retardant and heat insulator.

1108. N. V. Albi Chemie. Werkwijze voor het bereiden van brandwerende middelen en voor de toepassing daarvan. **[Method of preparing fire-retardant substances and of applying them.]** *Netherlands Patent* No. 71, 463, Dec. 15, 1952. pp. 3. [Du.] P.O.

Hexamethylenetetramine and a urea salt of H_3PO_4, H_2SO_4 and/or sulphamic acid in (0·1–0·5)/1 *M* ratio are mixed. One part of the composition is dissolved in 0·3–10 parts by weight of water. The solution is applied by brushing.

1109. Société pour la Fabrication d'Isolants et Revêtements Ligneux (Isorel) (S.A.). Procédé d'ignifugation des matériaux combustibles et produits en résultant. **[Method of fireproofing combustible materials.]** *French Patent* No. 1,049,068, Dec. 28, 1953. pp. 2. [F.] P.O.

The fireproofing coating consists essentially of: silicates of Al group metals (kaolin type); plasticizers (glycol, glycerol); carbonates of alkali earth metals, suspended in a diluent consisting of alkali metal silicate; a halogen derivative (silicofluoride), and a pigment.

1110. Guider, W. **Fire-resistant coatings for pit timber.** *Colliery Guardian, London* 188 (4854), 1954 (313–7). P.O.

Discusses fire-resistant coatings (cement, and limestone-silicate) and fire-resistant paints, and describes the B.S./A.R.P./39 and F.P.R.L. testing methods, as well as a new 'bath structure test' developed by the National Coal Board.

1111. **Use of fire-resistant timber in mines.** *Information Bulletin, National Coal Board, London* No. 54–106, 1954. pp. 6 + 2. P.O.

Discusses the standard of resistance to fire, methods of treatment, impregnation processes, surface treatment processes, and cost. The most effective salts are described in the appendix.

1112. HUBERT, E. E. **The use of fire retardants in a penta fence post preservative.** *Res. Note For. Exp. Sta. Idaho* No. 2, 1952. pp. 7 + 2 photos.

The need to protect fence posts against grass fires is discussed. Experiments showed that an 8% concentration of triphenyl phosphate by weight, added to oil-soluble pentachlorophenol, has very good fire-retardant properties, overcoming flames supported by a high % of carrier oil remaining in the treated wood. It would add 2–3 cents to the cost of treating a 5-in. post.

844. *Attack by Plant Organisms*

See also No. 1176.

1113. **List of publications relating to fungus defects in forest products and to decay in trees.** *Rep. U.S. For. Prod. Lab., Madison* No. 508, 1954. pp. 24. P.R.

1114. PŘÍHODA, A. Houby a bakterie poškozující dřevo. **[Fungi and bacteria injurious to wood.]** *Lesn. Knihovna (malá Řada).* No. 26, 1953. pp. 267. 189 refs. [Cz.] Price *Kčs.*16.95.

Roughly $\frac{4}{5}$ of the book contains illustrated descriptions of ca. 250 fungi. These are preceded by the description of: changes in wood caused by fungi and bacteria; importance of wood-attacking fungi in the forest (e.g. destruction of stumps); main kinds of rot (with a key for identification); mutual relationships between fungi, and protection of roundwood, converted wood, and wood products against fungi. The literature quoted is chiefly Czechoslovakian, Russian and German.

844.1. Sap-staining and Mould Fungi

See Nos. 1118–9, 1131.

844.2. Wood-destroying Fungi

See also Nos. 95, 129–30, 633–40, 909, 943, 1045, 1212–4.

1115. FINDLAY, W. P. K. **Types of rots in tropical timbers.** [*Pap.*] *8th int. bot. Congr., Paris, Sect. 20* 1954 (129–32). X.

1116. LABOUREUR, P. Contribution à l'étude de l'action des microorganismes sur la lignine. **[The action of microorganisms on lignin.]** [*Pap.*] *8th. int. bot. Congr. Paris, Sect. 23* 1954 (43–5). [F.] X.

A brief summary of research methods with some conclusions.

1117. RAYNAUD, M., PRÉVOT, A.-R., BIZZINI, B., and FISCHER, G. Étude sur les bactéries ligninolytiques. **[Study of 'ligninolytic' bacteria.]** [*Pap.*] *8th int. bot. Congr., Paris, Sect. 21* 1954 (20–1). 7 refs. [F.] X.

A number of bacteria belonging to the genus *Pseudomonas* were proved to be capable of attacking and decomposing lignin.

1118. **Forest botany. Session 7: rot fungi and decay injuries.** *Proc. 7th int. bot. Congr., Stockholm 1950,* 1953 (314–9) [E. or G.]

Papers (with discussion) by: *W. P. K. Findlay* and *J. G. Savory* on the breakdown of timber in water-cooling towers [cf. *For. Abstr.* 12 (No. 3049); 16 (No. 1129)]; *E. Rennerfelt* on heartwood constituents of some conifers and their fungicidal properties [cf. *For. Abstr.* 9 (No. 2277)]; *H. Francke-Grosmann* on the association of *Ips sexdentatus* and *Ophiostoma ips* [cf. *For. Abstr.* 12 (No. 3054)]; *A. Mathiesen* on blue-staining fungi and insects in Sweden [cf. *For. Abstr.* 12 (No. 3053)].

1119. MANGENOT, F. Acidité ionique et populations fongiques des bois. **[Acidity and fungus populations in wood.]** *Rev. gén. Bot.* 61 (721), 1954 (133–53). 14 refs. [F.f.] O.B.D.

Two sets of experiments are reported: (1) in which the acidity of different woods was estimated and the associated fungus population identified, and (2) in which the reactions were observed between certain wood-inhabiting fungi and the acidity of their media. In (1) the pH of aqueous extracts of sound and fungus-attacked wood of Beech, Ash, Goat Willow and Birch was measured. It was found that the same stem can contain wood of widely differing pH values with distinctly different associated fungus floras. In all woods invaded by a wood-rotting Hymenomycete, the acidity rises more or less steeply. Woods without Hymenomycetes but containing blue-stain fungi have a pH approaching that of sound wood. When blue-stained wood is invaded by a Hymenomycete its pH sinks and tends to become fixed at ca. 4·4, the figure varying according to which kind of fungus preponderates. If a decayed wood is invaded by blue-stain fungi its pH rises. In (2) 30 fungi were studied for their reaction with synthetic nutrient media at different pH values. Hymenomycetes all have an acidifying action of differing intensity, but their pH preferences vary. Dematiaceae, Sphaeropsidales and Pyrenomycetes generally have a neutralizing action, but again vary in their pH preference. Discomycetes and certain imperfect forms are strongly acidifying and show a more or less marked preference for high pH media. It must not be forgotten that in nature certain fungi are found on media with a pH which in these experiments was found unfavourable or inhibiting to growth. Acidity therefore is not the only factor determining the fungus flora of wood.

1120. GADD, G. O., and WARTIOVAARA, V. **On the chemical reaction causing rot stains in wet pulp and in wood.** *Pap. ja Puu* 36 (7), 1954 (291–4). 22 refs. [E.e.] P.R.

Seven rot fungi and 27 mould strains were cultivated in a sterile 1% malt-extract suspension. After the fungi had grown for a few weeks, the mycelium was filtered off and the clear filtrate tested by dropping a few drops on a sample of pulp moistened with pyrogallol. Only the filtrates from cultures of *Polyporus abietinus, Fomes annosus* and *Stereum sanguinolentum* produced spots similar to rot stains. Further tests with these suggested the presence of the enzyme laccase. The discoloration was found to be related to the supply of O to the

fungi but occurred even at very low O pressures, and is probably caused by a chemical reaction involving the conversion of phlobotannins to phlobaphenes. A rapid method for testing various substances for their power to prevent enzymatic oxidation of polyphenols is described. Among a number of substances tested, NaN_3 was found to inhibit the enzyme, and laboratory tests showed that it prevented rot and mould damage in wet pulp.

1121. FUKUYAMA, G., and KAWASE, K. [**A simple method for determining the degree of wood decay with dilute alkaline solution.**] *Res. Bull. Exp. For. Hokkaido Univ.* 17 (1), 1954 (151–78). 11 refs. [Jap.jap.e.]

Tables with English legends give the relation between the density and chemical composition of conifer wood decayed by different fungi and the volume of 0·1*N* NaOH (c.c./0·1 g. wood) consumed, when the wood is heated with NaOH. All results show increasing consumption of alkali, with increasing decay. The method gave satisfactory results when used on samples of wood from wooden bridges.

1122. FUKUYAMA, G., and KAWASE, K. [**A method for determining the degree of wood decay by nail-holding power.**] *Res. Bull. Exp. For. Hokkaido Univ.* 17 (1), 1954 (179–216). 31 refs. [Jap.jap.e.]

Nail-holding power, tested by a specially designed apparatus [illustrated] was found to be inversely proportional to moisture content and consumption of alkali solution [cf. preceding abstract] but directly proportional to density. The degree of decay in creosoted sleepers was measured by this method. [Results are given in tables and graphs with some English legends.] *From authors' summary.*

1123. MARSDEN, D. H. **Studies on the creosote fungus, *Hormodendrum resinae*.** *Mycologia* 46 (2), 1954 (161–83). 15 refs. P.R.

Describes 5 strains of this fungus which may commonly be isolated from wood treated with coal-tar or coal-tar creosote. It utilizes glucose and lignin readily as sole C sources, and $(NH_4)_2\ SO_4$, NH_4NO_3 and peptone as sole N sources. Coal-tar and creosote may serve as the sole C or N source. [Cf. *For. Abstr.* 13 (No. 1627).]

1124. HARMSEN, L. ***Merulius molluscus* Fr. another species of *Merulius* forming sclerotia.** [*Pap.*] *8th int. bot. Congr., Paris, Sect. 20.* 1954 (170–1). X.

A brief description of this little-known wood-rotting fungus.

1125. GREGORY, P. H., HIRST, J. M., and LAST, F. T. **Concentration of basidiospores of the dry rot fungus (*Merulius lacrymans*) in the air of buildings.** *Acta Allergologica, København* 6, 1953 (168–74). 6 refs. [E.e.] [Rothamsted Experimental Station, Harpenden.] L.S.

The spore content of the air in 2 buildings (one in London and one in the country) affected by dry rot ranged from 16,000 to 79,500 spores in the London house and from 1630 to 360,000 spores/cu.m. in the country house. An unaffected country cottage showed no spores of *M. lacrymans* in the air.

1126. DILLER, J. D., and KOCH, E. J. **Experience in growing *Merulius lacrymans* and *Poria incrassata* under forest conditions.** *Abstr.* in *Phytopathology* 44 (7), 1954 (388).

Inoculants of each of these fungi were successfully established in a small wooded area. Leaves and asphalt-saturated paper were used as insulating materials to maintain high relative humidity and favourable temperatures. Wedges (2 × 8 in.) of 40 durable wood species were randomized in the inoculants to test their natural resistance. After 6 months a quarter of the wedges were removed and it was found that their various weight losses ranged from 0 to over 50%.

1127. DILLER, J. D., and HUANG, S. W. **An experiment in growing *Merulius lacrymans* and *Poria incrassata* under root-cellar conditions.** *Abstr.* in *Phytopathology* 44 (7), 1954 (388).

Wood specimens (2 in. × 4 in. × 8 ft.) of Oak (*Quercus alba* or *Q. rubra*), *Pinus taeda* and *Pseudotsuga taxifolia* were set vertically in pails of soil infected by *Merulius lacrymans* or *Poria incrassata* and kept in a root cellar. During 2½ years the fungi advanced at about the same rate regardless of species, though infection began later in Douglas Fir than in the other two species. Both fungi appear to be most active in spring and summer.

1128. VERRALL, A. F. **Preventing and controlling water-conducting rot in buildings.** *Occ. Pap. Sth. For. Exp. Sta.* No. 133, 1954. pp. 14. 13 refs.

Description of *Merulius lacrymans* and *Poria incrassata*, followed by a survey of *Poria* cases in South U.S.A., and description of preventive and control measures.

1129. SAVORY, J. G. **Breakdown of timber by Ascomycetes and Fungi Imperfecti.** *Ann. appl. Biol.* 41 (2), 1954 (356–47 + 1 plate). 16 refs. O.R.E.

A study arising from an investigation of surface deterioration of timber in water-cooling towers. The term soft rot is proposed for this type of decay, which is caused by cellulose-destroying micro-fungi that initiate attack in the less heavily lignified parts of the walls of the wood elements. The fungal hyphae run spirally into the central zone of the secondary xylem walls where they give rise to cavities with pointed ends. The rate of attack is increased when inorganic nutrient salts are added to the wood. Lists are presented of types of structure in which soft rot was verified and of fungi isolated from such wood. *Chaetomium globosum* was the fungus most frequently isolated. In laboratory experiments it attacked hardwoods, but not softwoods. Observations are offered on the problem of soft rot in cooling towers. [Cf. *For. Abstr.* 15 (No. 845).]

1130. BLOHM, C. L., TARPLEE, M., and SMITH, E. C. **What's new in cooling-tower-wood maintenance?** *Oil and Gas Journal, Tulsa, Okla.* 52 (36), 1954 (78–81, 110, 113, 117–8. P.O.

[Cf. *For. Abstr.* 16 (No. 1096).] Presents the first results of studies by the technical subcommittee of the Cooling Tower Institute, on 103 cooling towers in the Gulf Coast area, showing 7 types of wood deterioration. Preliminary conclusions are that: (1) suitable water treatment can prevent excessive

chemical deterioration while minimizing the possibility of fungal infection; (2) the prevalence of decay is not such as to justify the use of treated wood in cooling towers; (3) high temperature intensifies surface attacks; (4) proper control of pH and temperature of inlet water reduces the wood loss from chemical or biological attack) to a minimum, the optimum pH range being 7·0–7·5.

1131. Ascorbe, F. J. **The inhibitory action of organic chemicals on a blue stain fungus.** *Carib. For.* 14 (3/4), 1953 (136–9). 5 refs.

Presents the results of tests of a large number of substances (mostly synthetic organic chemicals) on a species of *Trichosporium* isolated from blue-stained timber. Two procedures were used: (1) pieces of mycelium grown in liquid basal medium were added to a flask containing the test substance, and the culture was allowed to grow for a period of 9–10 days with an occasional shaking; (2) the inoculum, consisting of 0·2 ml. of a spore suspension in 0·1% Na lauryl sulphate, was grown for 7 days in a rotary-action flask-shaker machine operating at 240 oscillations/min. In both cases the temperature was 30° C. ± 2°. Results from (1) showed that pinosylvin and its derivatives are good inhibitors of growth of *Trichosporium* sp. under the conditions of the test. In (2) the following substances proved the best inhibitors: dinitro-*o*-cycloexyl phenol, dinitro-*o*-cresol, chloranil cyclopentadiene, para chloro-meta xylenol, dibenzoyl ethylene, phenanthrene quinhydrone, and 2-methyl-1,4-naphthoquinone.

1132. Scheffer, T. C., and Jones, T. W. **Control of decay in bolts and logs of northern hardwoods during storage.** *Sta. Pap. Ntheast. For. Exp. Sta.* No. 63, 1953. pp. 16.

Storage under a layer of wetted hay will give moderate protection; continuous wetting with a spray of water gives variable results. White and Yellow Birch and Hard and Soft Maple were protected for 2–3 months in summer by spraying the ends of the logs with different commercial fungicides containing Na pentachlorophenate. Protection over longer periods (> 6 months) was given by spraying followed by an end-coating treatment against seasoning checks. Beech and Black Oak were not protected by end treatment because of the relative susceptibility of their bark to fungus attack.

1133. Höpner, T. Pilzschäden am Zellstoffholz. **[Fungus damage in pulpwood.]** *Papier, Darmstadt* 6 (3/4), 1952 (47–53). 13 refs. [G.g.] L.S.

An illustrated description of the damage. Microscopic characteristics of pulp obtained from pulpwood and red rot, and the effect of red rot on the yield of sulphite digestion and on the properties of pulp are given.

1134. Martin, J. S., Kingsbury, R. M., McGovern, J. N., and Lloyd, R. A. **Utilization of white-pocket Douglas-Fir: pulping and chemical conversion.** *Rep. U.S. For. Prod. Lab., Madison* No. 1961, 1953. pp. 9 + 4 tbls. P.R.

Experiments showed that a considerable proportion of white-pocket rot can be present without loss in the yield of kraft pulp and without a great loss in the strength of the pulp. White-pocket rot showed no effect on the yield of semichemical pulps made under the mildest conditions. The yield of sugar from the rotted wood was comparable to that from normal wood.

1135. Briggs, E. V. **Utilization of white-pocket Douglas-Fir in containers.** *Rep. U.S. For. Prod. Lab., Madison* No. 1959, 1953. pp. 5 + 2 photos. 4 refs. P.R.

845. *Attack by Animals*

See also Nos. 675, 731, 1176.

845.2. Terrestrial Borers

1136. Kurir, A. Ein neuer Holzschädling für Mitteleuropa, der amerikanische Splintholzkäfer (*Lyctus planicollis* Lec.). **[A new timber pest in central Europe, *L. planicollis*.]** *Anz. Schädlingsk.* 27 (6), 1954 (81–6). 15 refs. [G.g.]

This pest was introduced into Austria in a consignment of Hickory laths from the U.S.A. in 1950–51. A description is given of the beetle, its habits and life history, with notes on control.

1137. **Bajuphon.** *Equipm. Note. FAO* No. *E*.3.54, 1954. pp. 1.

Describes an instrument invented by Dr. E. Gieseking of the Arbeitskreis Osmose-Bauholzschutz in Berlin, for detecting the presence of *Hylotrupes bajulus* larvae in timber. The instrument makes audible the sound of the larvae feeding. [Cf. *For. Abstr.* 13 (No. 2561); 14 (No. 1672).]

1138. Ein Hausbock-Horchgerät. **[An apparatus for detecting *Hylotrupes bajulus* by sound.]** *Int. Holzmarkt* 45 (2), 1954 (17). [G.]

Cf. preceding abtract.

1139. ***Hylotrupes bajulus* (L.) (House Longicorn).** *Distr. Maps Insect Pests* (*Ser. A*). No. 42, 1954. pp. [2].

1140. **The house longhorn beetle, *Hylotrupes bajulus*: biological investigations.** *Rep. For. Prod. Res. Bd., Lond. 1953*, 1954 (39–40).

Observations on the effect of temperature and humidity on the incubation period of the eggs indicate that variations in these factors may have an important bearing on the distribution and spread of attack. In normal conditions of temperature and humidity in a room or roof of a building, the proportion of eggs to hatch is surprisingly low, but at 25° C. and relative humidity [r.h.] of 75% most eggs will hatch. Larval growth is also closely related to temperature and r.h. At 25° C. and 75% r.h., larvae have attained a length of 25 mm. and more than 750 mg. in weight in 2 years, but pupation has not yet occurred. The effect of submitting individuals to low temperatures for different periods is being investigated to promote pupation and the completion of the life cycle of the insect. Experiments have been started to determine the food requirements of the larvae by inserting newly emerged individuals (egg-larvae) in samples of Corsican Pine from which the cell contents have been removed by leaching with water or acetone. Preliminary trial has shown larval development to be greatly retarded in water-extracted samples and hardly at all in those extracted with acetone.

1141. Becker, W. B. **The old house borer in Massachusetts.** *J. econ. Ent.* 47 (2), 1954 (362–3).

A brief survey of infestations by *Hylotrupes bajulus* in this state.

1142. Menon, K. D. **Longhorn beetle attack on timber in buildings.** *Malay. Forester* 17 (3), 1954 (143–6 + 2 photos). 4 refs.

Records several infestations of roof poles by *Stromatium longicorne*.

1143. Tack, C. H. **A note on the Forests (Pest Control) Rules 1952.** *Tech. Note For. Dep. Uganda* No. 3, 1953. pp. 1.

Instructions to sawmillers and merchants on the rule that requires all susceptible timber to be dipped in a preservative solution immediately after sawing. Solutions and suitable dipping tanks are detailed.

1144. Koehler, W., and Zdanowicz, Z. O zabespieczeniu niekorowanego surowca sosnowego na składach tartacznych przed szkodliwymi owadami. **[Protection of unbarked timber in sawmill yards against insect pests.]** *Roczn. Nauk lešn.* 4, 1954 (19–59). 11 refs. [Pol.pol.russ.e.] (*Prace Inst. Bad. Leśn.* No. 106.)

Results are tabulated of tests in 1952 at two widely separated sawmills on stacks of unbarked timber, both in the yards and in the adjacent forest. The following insecticides or mixtures of them were dusted or sprayed: BHC, DDT, Na_2SiF_6, saturated NaCl solution, creosote, carbolineum, Azotox [a DDT emulsion] and Arsopul [containing 12% Ca arsenate] and infestation of the treated stacks then compared with controls. The results justified chemical treatment in preference to barking; BHC + DDT was more efficacious than either separately; spraying gave better results than dusting; very satisfactory results were obtained with DDT emulsion spraying followed by Na_2SiF_6 dusting; and by dusting the timber with a BHC preparation and then covering with Pine branches.

1145. Back, R. C., and Sittig, M. **The control of pests in green lumber and pulpwood with benzene hexachloride.** *Tappi* 37 (5), 1954 (190*A*–191*A*). P.R.

Describes solutions, emulsions and wettable powders containing BHC, and their application. When in oil solution or emulsion, BHC efficiently controls Scolytidae, Platypodidae, Buprestidae and Cerambycidae on pulpwood for 3–4 months. Sprays or dips of BHC control these insects on green lumber.

1146. **[Protection of *Acacia seyal* logs against *Sinoxylon senegalensis*.]** *Rep. For. Dep. Sudan 1952/53*, 1954 (56).

The use of *A. seyal* has in the past been checked by its extreme susceptibility to attack, after felling, by the bostrychid *Sinoxylon senegalensis*. The use of creosote on green wood proved ineffective, and as a result of experiments the following treatment is recommended: (1) felling and barking; (2) soaking in water for 14 days; (3) air drying for 28 days; (4) placing in creosote, heating to 230° F. and leaving to cool for 18 hours; (5) stacking ready for sale. [Cf. *For. Abstr.* 15 (No. 861).]

845.3. Termites

See also No. 60.

1147. Cachan, P. Les termites de Madagascar et leurs dégats. **[The termites of Madagascar and the damage they cause.]** Institut de Recherche Scientifique, Tananarive-Tsimbazaza, Madagascar. 1950. pp. 32. 28 refs. [F.] Price *Fr.*100.

1148. **Termite investigations.** *Rep. Commonw. sci. industr. Res. Organ. Aust.* 1953 (70).

The addition of a small amount of pentachlorophenol to hardboard gave a board with high resistance to termite attack. The order of decreasing resistance of 6 commercial timbers was *Syncarpia laurifolia*, *Eucalyptus crebra*, *E. tereticornis*, *E. paniculata*, *E. micrantha* and *E. grandis*. The annual examination of soil poisoning tests showed that both creosote and 5% pentachlorophenol (both at the rate of 0·5 gal./cu. ft. soil) which had given complete protection against *Nasutitermes exitiosus* for 4 years began to break down in the fifth. Five % Na pentachlorophenate and 10% Na arsenite have each given complete protection for 4 and DDT for 3 years. In similar tests against *Coptotermes lacteus*, 5% DDT, 5% pentachlorophenol, and creosote have all given complete protection for at least 2 years. Additional soil tests have been installed.

846. *Steaming*

1149. Rogister, J., and Eeckhout, L. E. De invloed van het stomen op het drogen van hout. **[The effect of steaming on the drying of wood.]** *Meded. Lab. Houttechnol., Gent* [1954?]. pp. 17. 13 refs. [Flem.f.e.g.]

Summarizes literature on the effect of steaming on the physical and mechanical properties of wood, and on its advantages and disadvantages. In a series of experiments on specimens of Poplar it was found that steaming only very slightly reduced the time needed for air or kiln drying and would be economically justifiable only where sterilization, change of colour or softening of the wood is required. Results are given in graphs.

847. *Drying* (*Seasoning*)

See also Nos. 991, 1001, 1149, 1220.

1150. Peck, E. C. **Effects of machine stacking on drying rate and degrade.** *Sth. Lumberm.* 189 (2362), 1954 (62 . . . 67).

Presents data from a study made by the U.S. Forest Products Laboratory on 1-in. Beech lumber piled for air drying near Philadelphia, Pa. A chart is presented showing air-drying periods based on a final m.c. of 15% and on one of 20%. The chart may be used in climates similar to that of Pennsylvania.

1151. Smith, H. H. **Seasoning California hardwoods.** *Tech. Pap. Calif. For. Range Exp. Sta.* No. 5, 1954. pp. 18. 7 refs.

Results of two series of experiments showed that: (1) 1-in. and 2-in. *Umbellularia californica* is easy to dry; (2) 1-in. *Lithocarpus densiflorus* and *Arbutus menziesii* can be seasoned by careful air-drying followed by kiln-drying, but greater thicknesses are

difficult to dry satisfactorily even under carefully controlled conditions; (3) *Castanopsis chrysophylla* is difficult to dry and excessive degrade develops; and (4) warping is the most serious difficulty, and such measures as good piling are important.

1152. RIETZ, R. C. **Kiln drying of Engelmann Spruce.** *Rep. U.S. For. Prod. Lab., Madison* No. *R*1944–6, [*n.d.*]. pp. 5 + 9 photos + 5 tbls. P.R.

Includes information on sorting, piling and protection prior to drying, and several kiln-drying schedules.

1153. RIETZ, R. C. **Subject-matter index for dry-kiln operators.** *Rep. U.S. For. Prod. Lab., Madison* No. 1975, 1954. pp. 8. P.R.

An index system developed at Madison for filing information for future reference. Under 18 general headings, it uses a three-number system, e.g. '2–12–2 electrical moisture determination methods'.

1154. **Use of kiln samples in operating a lumber dry kiln.** *Rep. U.S. For. Prod. Lab., Madison* No. 1607 (rev.) 1954. pp. 10 + 2 photos, 4 dgms. 4 refs. P.R.

Cf. *For. Abstr.* 10 (No. 2103).

1155. WRIGHT, G. W., TURNBULL, R. F., CAMPBELL, G. S., COLWELL, S. J., and ROBERTS, H. D. **Project U.9—Studies in wood harvesting and log conversion methods. Progress report No. 21. Project S.3-2—Seasoning of timbers at commercial plants in Victoria. Progress report No. 13. Experiments U.9/13 and S.3-2/12. The relative economy of milling, seasoning, machining and handling $\frac{3}{4}$ in. thick and $\frac{9}{16}$ in. thick flooring.** Division of Forest Products, C.S.I.R.O., Melbourne. 1953. pp. 55 + 12 photos + 4 dgms. + 7 gphs. + 1 tbl. 3 refs. Limited distribution. P.R.

The factors influencing the production and processing of boards 6 in. wide are more favourable if the end product is $\frac{9}{16}$ in. flooring than if it is $\frac{3}{4}$ in. flooring.

1156. WRIGHT, G. W. **The purpose and economics of predriers.** *Aust. Timb. J.* 20 (3), 1954 (199 . . . 210, 256).

The purpose of pre-drying and a typical pre-drier [cf. *For. Abstr.* 9 (No. 2440)] are described, and costs of installation for combined air drying and kiln drying, combined pre-drying and kilning, kilning alone and pre-drying alone are tabulated with an indication of the value of timber stocks required for each method. Details of drying costs and quality of seasoned wood for pre-drying are scanty.

1157. **Tests on the effect of air speeds on drying rates [in 1-in. Beech].** *Rep. For. Prod. Res. Bd., Lond. 1953*, 1954 (11–2).

The effect of air speeds and relative humidity (r.h.) on the drying rate of samples on the air-inlet side of a pile was investigated, using a constant-temperature schedule with humidities normally recommended for Beech. The fan was run to produce speeds of $2\frac{1}{2}$, 5 and 11 ft./sec. through the 1-in. air spaces. Drying curves show that the times taken to dry to 12% m.c. were 7, $5\frac{1}{2}$ and 4 days respectively. Air speed had its greatest effect on drying rate during the relatively free-drying period when the wood was green; from 30% m.c. down, when the transfusion rate through the wood became the main factor in determining drying rate, the effect was small. A fourth run was carried out with an air speed of 5 ft./sec. and air humidities adjusted to produce virtually the same drying rate as that previously produced with an air speed of $11\frac{1}{2}$ ft./sec. This could be done by applying humidities some 10–15% lower during the early stages and approximately similar humidities after the m.c. had fallen to about 45%. These results tend to confirm the view that an increased air speed reduces the thickness of the film of cooler, more humid, air that tends to accumulate over the surfaces of relatively free drying material and so in effect reduces the surface air humidity. A relationship between air speeds and the r.h. of the incoming air was also established for a particular set of conditions. Further series of tests designed to determine the influence of air speed on the drying rates of other species and on the drying lag across a wide pile are in progress.

1158. **Seasoning in superheated steam.** *Rep. For. Prod. Res. Bd., Lond. 1953*, 1954 (12 + 1 photo).

One-in. boards of Abura [*Mitragyna* spp.] and Obeche [*Triplochiton scleroxylon*] were dried to the schedules normally recommended, or in steam superheated to 110° C. Both species dried in about $\frac{1}{3}$ the normal time in superheated steam with only slightly greater checking and distortion. Some, not very pronounced, collapse occurred. [Cf. *For. Abstr.* 15 (No. 880).]

1159. HARTWIG, G. Droging van hout bo 100° C. **[Drying wood above 100° C.]** *J. S. Afr. For. Ass.* No. 24, 1954 (29–43). 16 refs. [Afrik.afrik.]

The principles and methods of high-temperature drying are discussed and results of tests on different species in Europe and Canada are summarized. At the University of Stellenbosch *Pinus pinaster*, *P. radiata* and *P. pinea* were satisfactorily dried from green in 23–32 hr., *Eucalyptus cladocalyx* and Imbuya [*Phoebe porosa*] from air-dry in about $11\frac{1}{2}$ hr. and *Robinia pseudoacacia* in $47\frac{1}{2}$ hr. Further research on suitable schedules is needed.

1160. MIKIT, È. A., and UPMANIS, K. K. Suška pilomaterialov pri povyšennoï temperature. **[High-temperature seasoning of sawn timber.]** *Derev. lesohim. Prom.* 3 (8), 1954 (3–5). [Russ.] P.R.

Describes and illustrates a kiln for seasoning Pine and Spruce sawn timber (for furniture manufacture) in 'superheated steam' up to 115° C. It was found that by using high-temperature seasoning schedules the drying of sawn timber from 60–70 to 7–8% moisture content could be effected in 52 hours for 70 × 85-mm. and in 40 hours for 50 × 80-mm. scantlings. The schedule for the latter material was: 3 hours' steaming with saturated steam up to 100°, the steam being conducted from the boiler into both kiln chamber and radiators; 8 hours' seasoning at 107°; 3 hours' steaming at 98–100° with partial admission of saturated steam; again 8 hours at 107°, and so on. Similar kilns (with some constructional faults) have been in operation in Latvia since the end of 1952. [The quality of the seasoned timber is not described.]

1161. KIEFER, O. Ein Hochtemperatur-Trockner für den Kleinbetrieb. [**A high-temperature drier for small firms.**] *Int. Holzmarkt* 44 (5), 1954 (32–3). [G.]

Describes with illustrations the 'Tresor' (Maschinenfabrik Gg. Kiefer, Stuttgart-Feuerbach), a drying chest in which timber is dried in steam at a temperature of 125° C. (thermostatically controlled). The capacity is ¾ cu.m. and the maximum plank length 2·5 m.

1162. MCGLAUFLIN, R. **Inexpensive dry kiln construction.** *Report of the 13th Vermont Wood Products Conference, Northfield* 1953 (15–26 + 13 photos + 3 dgms.). P.R.

Illustrated description of several types of low-priced kilns with internal fans, vents for the escape of moisture, and steam heating.

1163. Es. Technische Neuheiten. Der Kleintrockner HD74—eine neue Holztrockenmaschine. [**Technical novelties. The HD74 small drier, a new wood-seasoning machine.**] *Holz-Zbl.* 80 (84), 1954 (1020). [G.]

Illustrated description of a new German-made portable kiln. The chamber is made of steel (for softwoods) or of aluminium (for hardwoods). Transverse air ventilation is secured by an internal fan driven by an externally fitted motor. The timber stack of 80 × 100 × 250 cm. loses ca. 15 kg. water/hour. Longer timber can be dried in compound driers made up of several of these driers joined end to end.

1164. GRAHAM, R. D. **Vapor drying of Western woods.** *Rep. Ore. For. Prod. Lab.* No. *D*-2, 1954. pp. 11 + 1 dgm. + 4 gphs.

Detailed results for Douglas Fir (1-, 2- and 4-in.) and Western Hemlock (2-in.) and preliminary results for Redwood, Pacific Madrone, Red Alder and Ponderosa Pine are tabulated.

1165. MCMILLEN, J. M., and JAMES, W. L. **Special methods of seasoning wood. High-frequency dielectric heating.** *Rep. U.S. For. Prod. Lab., Madison* No. 1665–7 (rev.) [*n.d.*]. pp. 4. 15 refs. P.R.

A review of literature.

1166. BIRJUKOV, V. A. Ravnomernostj prosyhanija pilomaterialov pri skorostnoï suške s primeneniem dièlektričeskogo i konvekcionnogo nagreva. [**Uniformity of the drying of sawn timber during rapid seasoning, with dielectric and convection heating.**] *Lesn. Prom.* 13 (7), 1953 (25–7). [Russ.]

Tests on an industrial scale showed that excessive dielectric heating causes a non-uniform drying of sawn timber. The use of preliminary convection heating followed by moderate dielectric heating is recommended. This procedure is said to result in uniform drying and reduction of costs. Graphs are presented showing the relationship and correlation between the uniformity of drying and the mean moisture content of the wood seasoned.

1167. ANDERSON, B. G., KNAUSS, A. C., and FRASHOUR, R. G. **Seasoning and machining degrade in young-growth Douglas Fir dimension lumber.** *Rep. Ore. For. Prod. Lab.* No. *D*-1, 1954. pp. 29 + 50 photos and gphs. 4 refs.

Degrade was measured in 10 kiln charges of timber surfaced either green or after kiln-drying. In the former no degrade occurred during machining, in the latter, neither the average final moisture content (m.c.) nor temperatures used in drying appeared to affect degrade amount appreciably, but degrade was lower when a low equilibrium m.c. was maintained during the schedule. Total degrade in the select structural grade was consistently higher than in No. 1 Common (No. 1 C). An average of 18% of the green pieces in both No. 1 C and No. 2 C grades contained black knots over ¾ in. diam. Nevertheless, average degrade from knot damage including knotholes was only about 4½% in No. 1 C and about 1⅛% in No. 2 C. Summary figures are given showing financial loss from degrade. Average shrinkage during drying to 12% m.c. was 3·5%, with 80% of the pieces shrinking 4·1% or less. Additional shrinkage when wood already dried to 18% m.c. was dried to 12% or 5% m.c. was 0·9% and 2·5% respectively. Shipping weight of S4S was reduced by drying from 2500–2800 lb./1000 bd. ft. (green), to 2170 lb. (18% m.c.) or 2080 lb. (12% m.c.). Drying times to 18% ranged from 48 to 90 hr. and to 12% m.c. from 110 to 120 hr. Results are tabulated.

1168. KING, W. W. **Cause of and remedy for warped southern Pine 2 × 4's.** *Sth Lumberm.* 189 (2361), 1954 (31–4).

A study of Yellow Pine 2 × 4's, 8 ft. long, showed that the factors (illustrated) most frequently causing warping are: the appearance of pith on one of the surfaces for all or part of the length; the presence of compression wood; the presence of fewer than 4 growth-rings/in. on both ends; and the presence of 4 or more rings/in. on one or both ends not showing the pith but with fast growth close to it. Wood in these 4 categories accounted for 78% of 2 × 4's warping in storage, while ⅓ of the warped material showed pith. Recommendations are made for changes in sawing practice and log selection to avoid these causes of warping.

1169. STRIHA, I. A. Pričiny deformacii detaleï iz drevesiny i sposoby ee umenjšenija. [**Causes of deformation of wooden details and methods of reducing it.**] *Derev. lesohim. Prom.* 3 (7), 1954 (7–11). [Russ.russ.] P.R.

The author found that the main cause of the warping of wooden details (made of Oak, Birch and, especially, Beech) is to be looked for in the longitudinal internal compression and tension stresses generated in the wood during the growth of the stem. The tension stresses average 125 kg./sq. cm. in Carpathian Beech, 110 in Caucasian Beech, 75 in Oak, and 35·5 in Birch, the mean values of relative deformation along the grain being 1·50, 0·75 and 0·35% for Beech, Oak and Birch, respectively. The bow is tabulated for 185 × 8·5 × 3·5 cm. boards (flat-sawn and quarter-sawn) obtained from tangential, radial, and 'semi-radial' [intermediate?] cuts of Beech, Oak and Birch; other tables and graphs show the effect of steaming (with and without restraint) on warping, the moisture-induced relaxation of internal growth stresses and the plasticization of the

corresponding fibre deformation during the seasoning of boards, and the straightening of warped converted material of Beech during seasoning under restraint. The author recommends the following measures for reducing the deformation of details made of Beech, Oak and Birch: (1) symmetrical breakdown of logs and radial sawing; (2) steaming of converted Beech and Birch in the form of planks and boards; (3) seasoning in the form of rather narrower boards and half-boards; (4) preliminary air-drying before kiln-drying; (5) seasoning, steaming, and cooling of the converted material only under restraint, and (6) transport by rail, only when packed tightly, in seasoned condition and in covered wagons.

1170. KISHEN, J. **Surface cracking of Bakli (*Anogeissus latifolia*) and Sal (*Shorea robusta*) during drying.** *Indian For.* 80 (8), 1954 (469–76). 9 refs.

The critical moisture gradient (moisture gradient on the surface of the wood at the time of cracking) has been determined for both species, and an attempt is made to correlate this with maximum strain || and the coefficient of shrinkage.

848. *Timberyard Practice. Handling and Storage of Timber*

See also No. 1132.

1171. HYLER, J. E. **Modern sawmilling. Parts 1 to 5.** *Sth. Lumberm.* 189 (2359–2363), 1954 (57 . . . 60; 53 . . . 60; 45 . . . 48; 53 . . . 58; 57 . . . 60).

Discusses storage in log ponds and the equipment used, bundling for water storage and saws for sawing logs still in the pond, loading equipment for use by the pond or on land, transport within the mill and conversion of waste into pulpwood chips.

1172. MAZURENKO, A. P. Ustanovka dlja sortirovki lesa na verhnih i nižnih skladah. [**Arrangement for sorting timber at log depots.**] *Lesn. Prom.* 13 (8), 1953 (20–1). [Russ.]

Illustrated description of an appliance enabling trolleys to be driven on rails by means of a continuously moving cable operated by a single-drum winch (e.g. TL-1). The trolley is fitted with a brake. The cable is secured to the trolley by means of a special clamp.

1173. PERVUHIN, A. G. Primenenie avtopogruzčikov na špalozavodah. [**Using lorry loaders in sleeper plants.**] *Lesn. Prom.* 13 (11), 1953 (24–5). [Russ.]

Illustrated description of a lorry loader (weight 4600 kg., hoisting capacity 3000 kg., hoisting height 3–4 m.) with a hydraulically operated fork-support. The loader is used for both loading sleepers on to railway wagons and transporting them from plants to depots; performance in the latter function is up to 200–250 cu.m. per machine-shift (distance 150 m.), the machine being serviced by 2 workers.

1174. FOLKVARD, E.; LIER, B.; SEEM, M. **General investigations of stacking and transport in the sawmilling industry. Part 1—A survey. Part 2—Different stacking methods and their capacity. Part 3—An economic discussion of transport and stacking methods.** *Transl. Commonw. sci. industr. Res. Organ. Aust.* No. 2290, 1954. pp. 15 + 11 photos + 7 gphs. Transl. by A. J. Thomas and H. E. Kijlstra from *Norsk Skogind.* 7 (7), 1953 (216–26). [See *For. Abstr.* 15 (No. 886).] Limited distribution.

85. GRADING OF WOOD AND WOOD PRODUCTS

852. *Detection, Recognition and Assessment of Injuries and Defects*

See also Nos. 583, 589–90, 732, 753–4, 879–80, 1023–4, 1167–70.

1175. PACLT, J. Kazy dreva. [**The defects of wood.**] Štátne Nakladatel'stvo Technickej Literatúry, Bratislava. 1954. pp. 93. 4 pp. of refs. [Slovak.]

A copiously illustrated reference booklet intended mainly for technicians in forest utilization and the wood-using industries. The chief sections classify and describe defects and damage by plant agencies to (*a*) unconverted and (*b*) converted wood. Separate indexes are provided to Latin names of organisms, authors cited, and subjects.

1176. BJÖRKMAN, E. Virkesskador och virkesvård. [**Timber defects and timber protection.**] *Forskning och Teknik, Nordisk Rotogravyrs Monografiserie, Stockholm* No. 3, 1953. pp. 23. [Sw.] P.R.

Contains sections on sinking during floating, mechanical defects (shakes), chemical defects (tannin damage and discoloration), biological defects (fungi, blue stain and insects) and protection for pulpwood and sawtimber (including methods of preventing sinking).

853. *Grading of Wood in the Rough*

See also Nos. 511, 1011–3, 1018.

1177. KRUEGER, M. E., ZIVNUSKA, J. A., and GRAH, R. F. **Lumber grade recovery from a second-growth Pine operation in California.** *Hilgardia, Berkeley, Calif.* 22 (10), 1953 (367–82).

Results are given in graphs and tables showing grade recovery, overrun and underrun and sawing time for logs from young trees in essentially even-aged stands at medium elevations. A system of log grades for second-growth Ponderosa Pine is given.

854. *Grading of Converted Timber*

See also Nos. 907–8, 1001, 1003–6, 1027–8.

1178. [**Grading rules for structural timbers.**] Norwegian standards Committee, bulletin No. 242: revised proposals for a Norwegian standard N.S. 447. *Transl. Commonw. sci. industr. Res. Organ. Aust.* No. 2261, 1954. pp. 15 + 21 photos + 11 dgms. Transl. by H. E. Kijlstra from *Norsk Skogind.* 7 (10), 1953 (322–34). Limited distribution.

Preliminary proposals are presented for comment.

1179. ROSS, W. **Control of lumber grading in B.C.** *B.C. Lumberm.* 38 (4; 5), 1954 (77–80; 72–4).

A history of the development of grading in the present century.

1180. **A reputation for integrity [: the work in grading control of the Pacific Lumber Inspection Bureau].** *B.C. Lumberm.* 38 (6), 1954 (82 . . . 86).

Cf. preceding abstract.

86. PULP INDUSTRIES. COMPOSITE MATERIALS MADE WHOLLY OR PARTLY OF WOODY MATTER. CHEMICAL UTILIZATION OF WOOD

See also section 813.

861. *Pulp and Paper Manufacture. Textile and Other Cellulose Derivatives*

See also Nos. 817, 871–2, 1120, 1133–4.

1181. **Partial list of reference works on pulp and paper.** *Rep. U.S. For. Prod. Lab., Madison* No. 564 (rev.) 1954. pp. 7. P.R.

1182. BHAT, R. V., and ASTHANA, S. C. **Indigenous cellulosic raw materials for the production of pulp, paper and board. Part XXI. Soda pulps for writing and printing papers from *Themeda cymbaria* Hack. (elephant grass).** *Indian For.* 80 (7), 1954 (409–14).

Easy-bleaching pulps of satisfactory strength can be prepared from this grass, which is available in large quantities in the deciduous forests of the Travancore-Cochin State. Average fibre length is 1·08 mm.

1183. BHAT, R. V., and SINGH, M. M. **Indigenous cellulosic raw materials for the production of pulp, paper and board. Part XXII. Wrapping papers from *Trema orientalis* Blume.** *Indian For.* 80 (8), 1954 (453–65 + 8 sample sheets). 2 refs.

Experiments have shown that *T. orientalis* is a promising raw material for the production of wrapping papers in high yields and of satisfactory strength. Since this wood is short-fibred, it will be necessary to mix a suitable quantity of Bamboo pulp.

1184. CHITTENDEN, A. E., JARMAN, C. G., MORTON, D., and PICKERING, G. B. **Three timbers from Kenya, *Neoboutonia macrocalyx*, Pax., *Macaranga kilimandscharica*, Pax., and *Croton macrostachys*, Hochst., as paper-making materials.** *Colon. Plant Anim. Prod.* 4 (1), 1954 (46–52 + 2 gphs.).

N. macrocalyx and *C. macrostachys*, when pulped by the sulphate process, gave pulps of moderate strength which might be incorporated in writing or printing papers after bleaching. *M. kilimandscharica* gave pulp of poor strength.

1185. **Density, fiber length, and yields of pulp for various species of wood.** *Tech. Note U.S. For. Prod. Lab., Madison* No. 191 (rev.) 1953. pp. [2] + 4 tbls. P.R.

Tabulates data for 46 coniferous and 57 broad-leaved American species.

1186. TROXELL, H. E. **The use of Rocky Mountain species for pulping.** *J. For.* 52 (8), 1954 (583–6). 12 refs.

Details the pulping qualities in the sulphite, sulphate and groundwood processes, of the most important species available in 9 Rocky Mountain states. Western Hemlock, Engelmann Spruce, Ponderosa, and Lodgepole Pines, Douglas Fir, Western Larch, true Firs, Western White Pine, Western Red Cedar, and Aspen, are included.

1187. JENSEN, W., and BRUUN, C.-E. Björk som råmaterial för massaframställning. VI. Jämförande sulfatkok av ved av *Betula verrucosa* och *Betula pubescens* från olika delar av Finland. **[Birch as raw material for pulp. VI. Comparative sulphate cooks of *B. verrucosa* and *B. pubescens* from different parts of Finland.]** *Pap. ja Puu* 36 (8), 1954 (321 . . . 324). 4 refs. [Sw.e.] P.R.

[Cf. *For. Abstr.* 14 (No. 3934).] In cooks of wood from 8 places in Finland, that from S. and Central Finland gave better yields and stronger pulp than that from N. Finland. *B. verrucosa* from S. and Central Finland gave higher yields, lower Roe numbers and stronger pulp than *B. pubescens* from the same areas.

1188. MACLAURIN, D. J., and WHALEN, J. F. **Continuous high-yield kraft pulping of Douglas-Fir lumber waste.** *Tappi* 37 (4), 1954 (143–7). 14 refs. P.R.

High-yield (60–70%) pulps were prepared in an apparatus similar to the Chemipulper from box ends, chipped slabwood, tops and limbs, and chipped logs. In general, the yield decreased as the concentration of the cooking chemical and the pressure increased. Pulp strength increased and the yield decreased with increased size of chip.

1189. BRANDAL, J., and OTTAR, H. Noen forsøkresultater fra slipning av bakhon. **[Some research results from grinding slabs and edgings.]** *Norsk Skogind.* 8 (6), 1954 (210–6). [Nor.e.] [Papirindustriens Forskningsinstitutt, Skøyen.] P.R.

Slabs and edgings from Spruce logs floated and barked before sawing, were ground and pulped on a mill scale. Pulp quality was roughly the same as for ordinary pulpwood except that the shive content was higher. Yields from thin slabs and edgings were rather lower than from thick ones or from ordinary pulpwood. Results are shown in graphs and a table.

1190. JAYME, G., and WÖRNER, G. Über den Aufschluss von Fichtenholz mit alkalischen Hypodisulfitlösungen. **[Digestion of Spruce with alkaline solutions of $Na_2S_2O_4$.]** *Papier, Darmstadt* 6 (5/6), 1952 (80–6). 6 refs. [G.g.] L.S.

$Na_2S_2O_4$ in optimum concentration with NaOH solution in optimum concentration facilitates the removal of lignin and reduces the amount of the removed polysaccharides and their degradation.

1191. JAYME, G., and WÖRNER, G. Über vergleichende alkalische Aufschlüsse von Fichtenholz unter Zusatz von Hypodisulfit und Sulfit. **[Comparative alkaline digestions of Spruce with additions of $Na_2S_2O_4$ and Na_2SO_3.]** *Papier, Darmstadt* 6 (11/12), 1952 (220–2). 4 refs. [G.g.] L.S.

$Na_2S_2O_4$ has a specific effect (differing from that of Na_2SO_3) when added to cooks with NaOH. With $Na_2S_2O_4$ the total pulp yield is greater, but it contains even less white pulp than with Na_2SO_3.

1192. JAYME, G., and LICHT, W. Einfluss der Sulfidität beim alkalischen Aufschluss von Buchenholz. **[Effect of sulphide content in the alkali digestion of Beech.]** *Papier, Darmstadt* 6 (21/22; 23/24), 1952 (450–6; 510–3). 26 refs. [G.g.] L.S.

The optimum Na_2S content was found to be ca. 20%, but even as little as 5% has a markedly favourable effect on the yield and whiteness of the pulp.

1193. MILLER, H. (to Watervliet Paper Co.). **Pulping wood with sodium carbonate-lime solution.** *U.S. Patent* No. 2,599,571, June 10, 1952. pp. 3. P.O.

Chips of deciduous wood are impregnated with a 6% Na_2CO_3 solution at slightly above 212° F. for ca. 90 min., and then below 212° for 20 min., the excess of Na_2CO_3 solution is removed, the chips are impregnated with an aqueous suspension of $Ca(OH)_2$, and are then cooked for some 7 hours at ca. 280° in that suspension, after which the material is washed with water and the fibres are separated mechanically.

1194. BRINK, D. L. **The cooking process: XIII. The effect of aqueous solutions of pure sodium hydrosulfide on the constituents of [Aspen] wood.** *Abstr. of thesis*, in *Dissert. Abstr.* 14 (6), 1954 (928–9). [University of Minnesota.] O.R.S.

The nature of the process and the substances obtained are discussed and it is suggested, from the character of the residual wood and the nature of the identifiable low-molecular-weight degradation products, that aqueous solutions of pure NaHS are specific agents for the cleavage of protolignin linkages in Aspen.

862. *Composite Materials made Wholly or Partly of Woody Matter*

See also No. 1037.

1195. BRAUNS, O., and DANIELSSON, E. En apparat för provning av olika styrkeegenskaper hos träfiberplattor. **[A machine for testing various strength properties of fibreboards.]** *Svensk PappTidn.* 57 (14), 1954 (495–7). 2 refs. [Sw.] P.R.

Describes with illustrations a machine developed at the Wallboardindustriens Centrallaboratorium, Stockholm, to be made by A. B. Defibrator, Stockholm.

1196. BUMBA, V. **Artificial board.** *Indian Patent* No. 49,394, July 10, 1953. pp. 1. Price *Rs.*2. P.O.

An improved building block or board formed from a homogeneous mix of fibrous material (wood wool or wood shavings) soaked in lime water, cement and mica and/or asbestos powder.

1197. CENTURY WALLBOARDS LTD., and DENT, S. **Improvements in or relating to the manufacture of reinforced lightweight cementitious products.** *British Patent* No. 659,575, Oct. 24, 1951. pp. 4. P.O.

The object of the invention is a reinforced lightweight cementitious product in which the fibrous reinforcement consists of wood wool with fibres ca. 1–2 in. long, pretreated by immersion in Na-silicate solution to improve adhesion.

1198. AKTIEBOLAGET STATENS SKOGSINDUSTRIER. Sätt vid framställning av en produkt eller massa, företrädesvis avsedd för tillverkning av träullsplattor och liknande. **[Method of preparing a product or mass particularly suited for the manufacture of wood-wool boards and similar materials.]** *Swedish Patent* No. 133,153. Oct. 2, 1951. [Sw.] P.O.

Wood wool is sprayed with water containing a wetting agent, excess water is removed, and the mass mixed with cement.

1199. PETERSEN, J. P. R. Sätt att framställa byggnadsplattor. **[Method of manufacturing building boards.]** *Swedish Patent* No. 134, 483, Feb. 5, 1952. pp. 2 + 6 dgms. [Sw.] P.O.

The boards, of fibrous material (e.g. wood wool) with a binder, are pressed in such a manner that recesses are formed in the edge: concrete, suitably reinforced, is poured into these recesses to make a frame for the board.

1200. FRIKELL, G., and DÖLFES, H. (to Torf-oleum-Werke Eduard Dyckerhoff). Herstellung von Holzwolle-Leichtbauplatten. **[Manufacture of light-weight building boards from wood wool.]** *German Patent* No. 868,571, Feb. 26, 1953. pp. 2. [G.] P.O.

Waste product from the manufacture of wood-waste-gypsum building board is heated up to 130° C. in a current of hot air, to partly dehydrate the hydrated gypsum, after which the material is mixed with a suitable proportion of water and processed in the usual way.

1201. KOLLMANN, F. Stand der Technik bei der Herstellung von Holzspanplatten. **[The present status of technology in chipboard manufacture.]** *Holz Roh- u. Werkstoff* 12 (4), 1954 (117–34). 1 ref. [G.g.] P.R.

Tabulates the properties of 13 German-made chipboards and gives an illustrated description of machines for chipping, chip drying, chip screening, mixing of chips with the binder, dosing, moulding and pressing, as shown at the 1954 Hanover Fair.

1202. JUŠTŠUK, E., and JUŠTŠUK, J. Sätt att framställa isoleringsplattor eller andra isoleringskroppar. **[Method of manufacturing insulating boards and other insulating materials.]** *Swedish Patent* No. 132,844, Sept. 4, 1951. pp. 2. [Sw.] P.O.

A suspension in water of coarse particles (wood-waste chips, planings, ground bark, etc.) and fine particles (waste paper, peat, cellulose) is dehydrated in centrifugal water-extractors, so that the finer particles accumulate on the surface and form a dense layer between the coarser particles. The boards are then dried and heated.

1203. GRANHOLM, J. H., and SARETOK, V. Sätt vid framställning av föremål, såsom plattor, genom pressning av en av träpartiklar och en limlösning bestående massa. **[Method of preparing material, such as boards, by pressing a mass consisting of wood particles and a glue solution.]** *Swedish Patent* No. 132,914, Sept. 11, 1951. pp. 1 + 1 dgm. [Sw.] P.O.

Wood particles are sprayed with a glue solution while flowing down inclined metal plates maintained in a state of vibration; the mass obtained is pressed to form boards.

1204. ŠVARCMAN, G. M. Stoljarnye plity iz stružek i opilok. **[Chip-core panels from planings and sawdust.]** *Derev. lesohim. Prom.* 3 (7), 1954 (17–8). [Russ.] P.R.

Illustrated description of a new method of continuous manufacture of boards having a chipboard core with veneer facings. Urea-formaldehyde glues

are used as binders (proportion ca. 25% by weight), and urea- or phenol-formaldehyde glues are used for gluing on the face veneers (120–130 g./sq. m.). The density of the boards varies from 0·6 to 0·8 g./c.c., and their strength increases with density and proportion of binder.

1205. RITTER, E. J. Das Spanholz-Formteil. **[Chip mouldings.]** *Holz-Zbl.* 80 (69), 1954 (841–3).

An illustrated description of the manufacture of resin-bonded chip mouldings from the chemical and engineering standpoint.

1206. PERRY, H. J. (to J. P. Lewis Co.). **Method of making laminated fiberboard.** *U.S. Patent* No. 2,503,407, April 11, 1950. pp. 3. 8 refs. P.O.

Steamed wood blocks are ground, and the partially hydrolysed groundwood obtained is mixed with extracted Pinewood pitch, beaten into a homogeneous mixture which is formed into a web; a number of such partially dried webs are made into a laminate with thermosetting synthetic resin layers between each two webs and on the outer faces of the laminate.

1207. **Production of fibreboard from secondary colonial timbers.** *Rep. For. Prod. Res. Bd., Lond. 1953*, 1954 (44–5).

Using a 12-in. laboratory attrition mill, high-strength boards have been made from chips of *Mora gonggrijpii* and *Koompassia malaccensis* cooked with as little as 3·5% Na_2SO_3. Preliminary experiments have been made on *Shorea leprosula*, *S. laevis* and *Dipterocarpus crinitus*. [Cf. *For. Abstr.* 15 (No. 939).]

1208. KEATON, C. M. **The effect of operating variables on hardboard values.** *J. For. Prod. Res. Soc.* 4 (3), 1954 (146–7).

Tabulates results of experiments on the effect on physical properties of white water return %, temperature of the slurry and pH.

1209. BORCHGREVINK, G. **Product and process variables related to the effect of moisture on hardboard.** *J. For. Prod. Res. Soc.* 4 (3), 1954 (142–4).

The variables discussed are the wood, and those occurring during the different processes, cooking and defibration, additive treatment and sizing, pressing and subsequent treatment.

1210. STILLINGER, J. R., and CURRIER, R. A. **Relative humidity, moisture content, and dimensional stability relationships in hardboard of three manufacturers.** *Rep. Ore. For. Prod. Lab.* No. *T*-7, 1954. pp. 14 + 32 gphs. P.R.

Results of tests with 11 types of commercial hardboard, during which the weight, thickness, linear dimensions, rate of moisture absorption, swelling and linear expansion of the boards were determined under changes in relative humidity (r.h.), show that: (i) important differences in the amount of moisture absorption and dimensional changes cannot so far be explained; (2) the equilibrium moisture content of commercial hardboards is definitely lower than that for wood, the former being ca. 50–75% of the latter for a given r.h. and temperature; (3) the variations in moisture content, thickness swelling and linear expansion with increasing r.h. are similar for all hardboard types, as are variations in thickness swelling or linear expansion with increasing m.c.

863. *Wood Hydrolysis. Saccharification*

See also No. 1134.

1211. WENZL, H. F. J. Chemie und Technik der Säurehydrolyse des Holzes. I. Chemische Betrachtungen. **[Chemistry and technology of the acid hydrolysis of wood. I. Chemical considerations.]** *Holzforschung, Berlin* 8 (2), 1954 (33–41). 74 refs. [G.g.e.] P.R.

A review (74 references, German, Scandinavian, British, American, French, dated since 1819).

864. *Utilization of Lignin*

1212. KUNZ, E. C., WESTON, W. H., JENNISON, M. W., SWEET, H. R., and KITCHENS, G. C. (to The Givaudan Corporation). **Process for forming a lignin concentrate.** *U.S. Patent* No. 2,671,751, March 9, 1954. pp. 3. 6 refs. P.O.

Wood is treated with cellulose-destroying organisms (*Fomes roseus*, *Trametes subroseus*, *Lentinus lepideus*, *Lenzites saepiaria*, *L. trabea*, *Polyporus palustris*, *P. schweinitzii*, *Poria incrassata*, *P. microspora*, *P. vaporaria*, *P. xantha*) in the presence of suitable nutrients at temperatures from 27 to 32° C., in order to obtain a lignin concentrate having at least 35% by weight of lignin.

1213. GOSS, W. C. (to E. S. Heller). **Method of making glue from wood and a lumber product.** *U.S. Patent* No. 2,545,459, March 20, 1951. pp. 3. 11 refs. P.O.

To obtain a glue-forming material, a mixture of wood and a material containing cellulose-consuming fungi is ground, the pH of the mixture is brought to < 7, and, after the major portion of cellulose has been consumed, the residue is ground in water to fluid consistency.

1214. NARAYANAMURTI, D., and GEORGE, J. **Studies on the biochemistry of wood-rotting fungi: part V—enzymatically liberated lignin and its applications.** *Comp. Wood* 1 (3), 1954 (51–5). 12 refs. P.R.

[For preceding parts see *For. Abstr.* 14 (Nos. 777, 3883–4); 15 (No. 841).] It was found that fungus-attacked sawdust of several Indian tree species could be moulded under heat and pressure. Tests on *Pinus longifolia* shavings and sawdust attacked by *Lenzites saepiaria* showed, in absolute figures, a considerable decrease in cellulose and pentosan contents, a slight decrease in lignin content and an increase in the extractive content, compared with unattacked material. The chemical composition (reduced OCH_3 content) of the residual lignin points to its having been degraded to a certain extent. The decayed material is plastic, and can be moulded with or without an addition of fresh sawdust. Particularly good moulding results were obtained when small quantities of polybasic acids and a phenol were added.

865. *Plastics*

See Nos. 1214, 1256–7.

866. *Utilization of Wood Extractives*

1215. Anderson, A. B. **Rosin from Jeffrey Pine stump wood.** *Tappi* 37 (7), 1954 (316–20). 27 refs. P.R.

The heartwood of well-seasoned stumps was found to contain ca. 26% C_6H_6-soluble extractive material, over ½ of which consists of resin acids; refining of the crude extract gave good yields of refined wood rosin, the properties of which are comparable to those of commercial refined wood rosins. The rosin contains ca. 80% resin acids of the diterpenic type.

1216. Štanageĭ, V. G. Izvlečenie kanifoli i terpentinnogo masla iz othodov proizvodstva. **[Recovery of rosin and turpentine oil from industrial wood waste.]** *Derev. lesohim. Prom.* 3 (7), 1954 (12–4). [Russ.] P.R.

Describes a technological process of multiple extraction, which is claimed to increase considerably the recovery of rosin from solid impurities (dirt): the non-recovered rosin content is reduced from ca. 50 to ca. 8% in relation to the weight of the dirt.

1217. Kurth, E. F., and Ross, J. D. **Volatile oil from Western Juniper.** *Rep. Ore. For. Prod. Lab.* No. *C*-3, 1954. pp. 18 + 2 dgms. + 4 gphs. 4 refs.

Thirty-two charges of wood from *J. occidentalis* were steam distilled and the composition and yield of the volatile oil determined. The wood was reduced to particles of various sizes by chipping and hammer-milling. Large chips gave substantially lower yield than the finer material. Low steam pressures (under 10 lb./sq. in.) gave higher yields of oil. Oil recovery averaged about 1·4% of dry weight, of which 15–40% was cedrol.

1218. Raoul, W. Contribuição para o estudo do óleo essencial de pau-rosa do Brasil. **[The essential oil of Brazilian Rosewood.]** Instituto Nacional de Tecnologia, Ministério do Trabalho, Indústria e Comércio, Rio de Janeiro. 1953. pp. 33. 11 refs. [Port. port.]

Physical and chemical properties of the oil which, it is suggested, may be extracted from any or all of the following species: *Aniba rosaedora* var. *amazonica*, *A. parviflora*, *Ocotea caudata*, *Licania guianensis*, and *Protium altissimum*.

1219. Gupta, R. C., and Muthana, M. S. **The essential oil from the wood of *Erythroxylum monogynum*. I.** *Journal of the Indian Institute of Science, Bangalore* 36*A* (2), 1954 (76–83). P.O.

Fractional steam distillation of the wood yielded, *inter alia*, a fraction closely resembling α-pinene, and another containing a diterpene hydrocarbon.

867. *Destructive Distillation*

See also Nos. 531, 937.

1220. Larionov, A. I. Vozdušnaja suška gazogeneratornyh čurok. **[Air seasoning of gas-producer wood-blocks.]** *Lesn. Prom.* 13 (7), 1953 (6–10). [Russ.]

Gas-producer blocks, 7 cm. long and ca. 2·5 sq. cm. in cross-section, made from green wood of *Larix sibirica*, were seasoned near Krasnoyarsk in cribwork wooden crates with a capacity of 0·45–1·70 cu.m. stacked measure, their dimensions being 1·7 × 1·0 × 0·25–1·0 m. From 7 July–10 Aug., with rather rainy weather, the mean daily moisture loss (based on initial m.c.) of blocks in crates stood upright was 1·7% for unprotected crates and 1·81% for one provided with a simple roof. Blocks in unroofed crates laid horizontally lost 1·08% daily. In all cases the side forming the top of the crate was open, i.e. without slats. Rain in daytime affected drying much less than night rain. From a special test with 4 crates, the relationship between the thickness of the layer of blocks and the uniformity of seasoning is tabulated, and that between the layer thickness and the average m.c. is graphed. An empirical formula is given for calculating the duration of seasoning from the green condition.

1221. Dyck, A. W. J. **Experimental fluid gasification of sawmill wood waste.** *Technical Bulletin, British Columbia Research Council, Vancouver* No. 18, 1950. pp. 50 + 13 tbls. 8 refs. L.S.

Describes a semi-pilot plant designed to check laboratory data for the rates of thermal decomposition of wood pieces of various size at different temperatures. It was shown that ca. 40,000 cu. ft. of wood gas (300 B.Th.U./cu. ft.) can be obtained from 2000 lb. of dry Cedar or Hemlock, when air alone is used for gasification. By using O and recycling wood gas (removing the CO_2 by scrubbing) the fuel value could be raised to 460 B.Th.U./cu. ft.

1222. Fukuyama, G., and Satonaka, S. **[Wood carbonization temperature and the products.]** *Res. Bull. Exp. For. Hokkaido Univ.* 17 (1), 1954 (127–49). 21 refs. [Jap.jap.e.]

Results, showing yields from *Quercus crispula* of charcoal, distillate and gas, shrinkage of test pieces, charcoal properties, and volume and composition of the gas for different temperatures, are given in tables and graphs with English legends.

1223. Kozlov, V. N., and Krymskiĭ, G. P. Obrazovanie letučih organičeskih kislot pri razloženii drevesiny i sostavnyh ee veščestv v vodnoĭ srede. **[Formation of volatile organic acids during the decomposition of wood and its constituents in an aqueous medium.]** *Ž. prikl. Him.* 27 (6), 1954 (662–8). 5 refs. [Russ.russ.] P.O.

Presents tabulated results of a chemical investigation on untreated and de-acetylated Birch and Pine sawdust, cotton linters, glucose, industrial (hydrolysis process) lignin, and Willstätter lignin. It was found that when acetic acid is formed from wood during thermal decomposition in an aqueous medium, its sources are not only acetyl groups but also hemicelluloses and cellulose. The higher yield of volatile acid from de-acetylated Birch compared with de-acetylated Pine material can be explained by higher hemicellulose content of the former.

1224. Kozlov, V. N., Araškevič, V. M., and Smolenskiĭ, V. B. Penoobrazovateli iz kisloĭ

drevesnoĭ smoly. **[Foaming agents from acid wood-tar.]** *Derev. lesohim. Prom.* 3 (7), 1954 (14–6). 4 refs. [Russ.russ.] P.R.

Crude oil obtained in a yield of ca. 50% from acid wood-tar contains over 80% of oily distillation residue with surface tension of 38·6 erg/sq. cm. and viscosity 0·0762 poises at 20° C. The volatile components of the crude oil are ketones. The oily residue is a valuable flotation oil.

869. *Miscellaneous*

1225. PURI, B. R., and GUPTA, H. L. **Formation of oxalic acid from sawdust of different woods.** *Indian For.* 80 (6), 1954 (352–3).

Sawdust from a number of common Indian species was fused with NaOH under optimum conditions for the formation of oxalic acid. *Dalbergia sissoo*, *Pinus longifolia*, *Dysoxylum malabaricum* and 'skin' of *Saccharum arundinaceum* gave the highest yields. Partial replacement of NaOH by $NaNO_3$ increased the yield.

89. OTHER ('MINOR') FOREST PRODUCTS

See also section 28.

892. *Vegetable Products*

1226. La production accessoire de la fôrêt méditerranéenne. **[Minor products of the Mediterranean forest.]** [*Docum.*] *4th Sess. FAO Jt. Subcomm. Medit. For. Probl.* No. *FAO/CEF/SCM/48* Add. 1, 1954. pp. 118. [F.]

Reviews the subject under the heads: spices, fibres, fruits and nuts, manna, forage and pasture, aromatic and medicinal plants, edible plants, tanstuffs and dyes, resins and gums, pipe blanks, and miscellaneous.

892.1. Grass. Litter. Leaf Fodder

See also Nos. 474–5, 1182.

1227. EVANS, J. D. D. **Potential fodder plants.** *Quart. J. For.* 48 (3), 1954 (237).

The common ivy, *Hedera helix*, is eaten by sheep and apparently does them no harm. The writer had a Larch plantation infested by ivy, which was entirely cleared by sheep which broke in during a severe winter.

892.4. Bark Products. Tanstuffs. Cork

See also Nos. 488, 831.

1228. SYKES, R. L., and SIMON, T. D. **Vegetable tannins in East Africa.** *E. Afr. agric. J.* 20 (1), 1954 (59–65). 21 refs.

Discusses world sources and gives a table showing analyses of material from 16 locally grown species which include likely commercial supplies from 2 species of *Acacia*, 1 *Combretum*, 1 *Eucalyptus* and 2 *Pinus*.

1229. **[Tannin content of Mangrove barks.]** *Rep. For. Res. W. Bengal 1950/51*, 1953 (17).

Tannin content on a zero moisture basis of *Ceriops candolleana* bark was 20·59%, and of *Rhizophora conjugata* 24·48%.

1230. KOVÁCS, I. A cserzökéreg száradása és az elérhetö kihozatal. **[The drying of tanbark and the output attainable.]** *Erdö* 2 (3), 1953 (228–43, 293, 296–7). [Hu.russ.g.]

A detailed study for Oak, Spruce and Alder bark, with tables and graphs showing loss of moisture in a 20-day period for both isolated and crop trees, bark % for a 4–24 cm. d.b.h. range (Oak) and weight of bark/cu.m. timber for a 4–20 cm. d.b.h. range (Oak). Drying was done out of doors, under the stand, and in open places.

1231. SANTA ROSA, J., and IACHAN, A. A raspa de juazeiro como detergente. **[Scrapings of *Zizyphus joazeiro* as a detergent.]** Instituto Nacional de Tecnologia, Ministério do Trabalho, Indústria e Comércio, Rio de Janeiro. 1951. pp. 38 + 3 plates. 125 refs. [Port.]

A study of the bark scrapings and their uses.

892.5. Medicinal Plants, Edible Plants, Insecticides from Plants, etc.

See also No. 831.

1232. FULLING, E. H. **American Witch Hazel. Part I.—History, nomenclature and early uses.** *Gdn. J. N.Y. bot. Gdn.* 4 (4), 1954 (97–101).

1233. COOKE, R. G., and HAYNES, H. F. **The alkaloids of *Cryptocarya angulata* C. T. White and *C. triplinervis* R. Br.** *Aust. J. Chem.* 7 (1), 1954 (99–103). 17 refs. O.R.S.

The bark of *C. triplinervis* yields the water-soluble alkaloid *iso*-corydine methiodide. The same compound has been obtained from the bark of *C. angulata* with roemerine and 3,4-dimethoxy-1-dimethylaminoethylphenanthrene.

1234. GELLERT, E., and RIGGS, N. V. **Cryptopleurine: an alkaloid of *Cryptocarya pleurosperma* White and Francis.** *Aust. J. Chem.* 7 (1), 1954 (112–20). 10 refs. O.R.S.

1235. EASTWOOD, F. W., HUGHES, G. K., and RITCHIE, E. **Alkaloids of the Australian Rutaceae: *Evodia xanthoxyloides* F. Muell. IV. The structures of evoxine and evoxoidine.** *Aust. J. Chem.* 7 (1), 1954 (87–98). 10 refs. O.R.S.

Cf. *For. Abstr.* 14 (No. 1764–5).

1236. HUGHES, G. K., and RITCHIE, E. **The chemical constituents of *Himantandra* species. 1. The lignans of *Himantandra baccata* Bail. and *H. belgraveana* F. Muell.** *Aust. J. Chem.* 7 (1), 1954 (104–12). 9 refs. O.R.S.

1237. KURUP, P. A., and NARASIMHA RAO, P. L. **Antibiotic principle from *Moringa pterygosperma*. Part I. Purification.** *Journal of the Indian Institute of Science, Bangalore* 34*A* (3), 1952 (219–27). 11 refs. L.S.

1238. KURUP, P. A., and NARASIMHA RAO, P. L. **Antibiotic principle from *Moringa pterygosperma*. Part II. Chemical nature of pterygospermin.** *Indian Journal of Medical Research, Kanpur* 42 (1), 1954 (85–95). 13 refs. [Indian Institute of Science, Bangalore.] O.R.S.

1239. GOPALAKRISHNA, K. S., KURUP, P. A., and NARASIMHA RAO, P. L. **Antibiotic principle from**

***Moringa pterygosperma*. Part III. Action of pterygospermin on germination of seeds and filamentous fungi.** *Indian Journal of Medical Research, Kanpur* 42 (1), 1954 (97–9). 3 refs. O.R.S.

Pterygospermin exerts a negligible effect on seed germination, but powerfully inhibits many filamentous fungi. *From authors' summary.*

1240. KURUP, P. A., and NARASIMHA RAO, P. L. **Antibiotic principle from *Moringa pterygosperma*. Part IV. The effect of addition of vitamins and amino-acids on the anti-bacterial activity of pterygospermin. Part V. Effect of pterygospermin on the assimilation of glutamic acid by *Micrococcus pyogenes* var. *aureus*.** *Indian Journal of Medical Research, Kanpur* 42 (1), 1954 (101–14). 17 refs. O.R.S.

1241. KURUP, P. A., NARASIMHA RAO, P. L., and VENKATARAMAN, R. **Antibiotic principle from *Moringa pterygosperma*: Part VI. Mechanism of anti-bacterial action of pterygospermin. Inhibition of transaminase by pterygospermin.** *Indian Journal of Medical Research, Kanpur* 42 (1), 1954 (115–23). 17 refs. O.R.S.

1242. **Safrole [from *Cinnamomum* sp.]** *Rep. For. Dep. Sarawak 1953*, 1954 (14–5).

C. iners and *C. parthenoxylon* gave poor yields, but the wood and bark of a third, unidentified species of *Cinnamomum* (known as *medang kerangas*) are a much more promising source of safrole, which plays an essential part in the manufacture of certain insecticides.

892.6. Resin and Turpentine. Essential Oils. Fixed Oils and Fats. Gums. Latex. Dyestuffs. Sap Sugar

See also Nos. 490, 831, 1215–9.

1243. MIROV, N. T. **Studies of the chemical composition of turpentines of the genus *Pinus* in relation to taxonomy.** [*Pap.*] *8th int. bot. Congr., Paris, Sect. 4* 1954 (47–9). 7 refs. X.

A short summary of recent research.

1244. LOMBARD, R., and ROTOVIC, B. Étude de la composition des sécrétions d'abiétinées: l'oléorésine de *Pinus leucodermis*. **[Study of the composition of secretions of the Abietineae: the oleoresin of *P. leucodermis*.]** *C.R. Acad. Sci., Paris* 238 (16), 1954 (1670–2). 5 refs. [F.f.] O.R.S.

1245. ROSENTHAL, F. R. T. Contribuição ao estudo da resina de cipó de breu. **[The resin of *Euphorbia phosphorea*.]** Instituto Nacional de Tecnologia, Ministério do Trabalho, Indústria e Comércio, Rio de Janeiro. 1953. pp. 47 + 1 tbl. 11 refs. [Port.]

Properties and uses.

1246. PUNTAMBEKAR, S. V., and BERI, R. M. **Resinol from the nuts of *Semecarpus travancoricus*.** *Proc. Indian Acad. Sci.* 39*A* (3), 1954 (137–43). 10 refs. O.R.S.

1247. FAROOQ, M. O., and VARSHNEY, I. P. Étude chimique de l'huile de la graine d'*Albizzia lebbek* Benth. **[Chemical study of the oil from seed of *A. lebbek*.]** *Bull. Soc. chim. France* 1954 (6), (739–41). 14 refs. [F.f.] [Muslim University, Aligarh, India.] O.R.S.

1248. FAROOQ, M. O., and SIDDIQUI, S. Étude chimique des lipides de la graine d'*Albizzia odoratissima* Benth. **[Chemical study of the lipides from the seed of *A. odoratissima*.]** *Bull. Soc. chim. France* 1954 (6), (741–3). 8 refs. [F.f.] [Muslim University, Aligarh, India.] O.R.S.

1249. LIGTHELM, S. P., HORN, D. H. S., SCHWARTZ, H. M., and HOLDT, M. M. VON. **A chemical study of the fruits of three South African *Ximenia* species, with special reference to kernel oils.** *J. Sci. Food Agric.* 5 (6), 1954 (281–8). 23 refs. [National Chemical Research Laboratory, Pretoria.] O.R.S.

X. caffra, *X. caffra* var. *natalensis*, *X. americana* var. *microphylla*.

1250. ROSENTHAL, F. R. T. Goma de cajueiro—estudo químico e tecnológico. **[Gum of *Anacardium occidentale*—a chemical and technological study.]** Instituto Nacional de Tecnologia, Ministério do Trabalho, Indústria e Comércio, Rio de Janeiro. 1951. pp. 35 + 3 plates. 10 refs. [Port.]

1251. ROSENTHAL, F. R. T. Goma de baraúna. **[Gum of *Schinopsis brasiliensis*.]** Instituto Nacional de Tecnologia, Ministério do Trabalho, Indústria e Comércio, Rio de Janeiro. 1950. pp. 31. 11 refs. [Port.]

Properties and uses.

1252. COVENEY, R. D., and ISLIP, H. T. **Gum arabic and soil from Somaliland protectorate.** *Colon. Plant Anim. Prod.* 4 (1), 1954 (42–5).

Examination of 30 samples of gum from *Acacia senegal* and of the soil on which it grows, showed no correlation between the viscosity of the gum and (*a*) ash content, (*b*) its Ca content, or (*c*) content of other mineral constituents. Thus though *Acacia* trees yielding gum in Somaliland grow on markedly calcareous soils and have a high viscosity, there is no relationship between these two circumstances.

1253. GROCHOWSKI, W., LASKOWSKA, W., and CZYŻMIANKA, J. Gutodajność trzmieliny w Polsce. **[Gutta-percha yield of *Euonymus* sp. in Poland.]** *Roczn. Nauk leśn.* 4, 1954 (207–42 + 1 map). 24 refs. [Pol.pol.russ.e.] (*Prace Inst. Bad. Leśn.* No. 119.)

The species chiefly exploited in Poland is *E. europaeus*. The effect of site on the content of gutta-percha is stressed.

892.7. Fruits. Seeds. Fibres, Yarns and Flosses

See also Nos. 105, 1246–9.

1254. PERERA, S. P. **Edible fruits of the forest.** *Ceylon Forester* (*n.s.*) 1 (4), 1954 (141–9). 3 refs.

Notes on 43 species found in the forests of Ceylon.

1255. TEWARI, M. C. **Protection of indigenous button nuts against insect attack.** *Indian For.* 80 (7), 1954 (417–8).

The seeds of *Corypha umbraculifera* are used for the manufacture of buttons, but are subject to insect attack. Experiments at Dehra Dun have shown that adequate protection can be obtained by soaking the green nuts (preferably after splitting and boring

with 0·5% H_3BO_3/borax mixture (50 : 50) or 0·6% $ZnCl_2$, in water solution.

1256. Araujo, A. Alves de, and Mano, E. Biasotto. Estudo sôbre a possibilidade de aproveitamento de casca de babaçu na industria de matérias plásticas. **[The use of Babassu husks in the plastics industry.]** *Boletim do INT, Rio de Janeiro* 3 (6), 1952 (28–41). 19 refs. [Port.port.]

Reports on experiments to investigate the properties of *Orbignya speciosa* shells after extraction of the kernels for oil. The experiments, which were conducted on a laboratory and semi-industrial scale, show that a substance is obtainable that might be used as a raw material in the plastics industry.

1257. Narayanamurti, D., and Singh, J. **Moulding powders and boards from Coconut shells.** *Comp. Wood* 1 (2), 1954 (38–40). 5 refs. P.R.

Describes the preparation and tabulates the properties of moulded products and boards made from thermally treated Coconut-shell powder, without or with the addition of other substances.

1258. Narayanamurti, D., and Singh, J. **Studies on adhesives: part XVIII—adhesives from Coconut shells.** *Comp. Wood* 1 (2), 1954 (41–2). 2 refs. P.R.

The preparation of the glue is described and the glue-line strengths with different wood species are tabulated.

892.8. Heather. Broom etc. Osiers. Canes and Bamboos. Reeds and Rushes. Thatching Materials

See No. 147.

9. FORESTS AND FORESTRY FROM THE NATIONAL POINT OF VIEW. SOCIAL ECONOMICS OF FORESTRY

90. GENERAL

902. *History of Forests and Forestry*

See also Nos. 484, 1324, 1326.

1259. McEvoy, T. **A review of Irish forestry.** *Irish For.* 11 (1), 1954 (20–7).

From prehistoric times to the present day.

1260. Uhl, H. Ein altbekannter Betriebsverband im Wandel der Zeiten. **[A long known working circle through the ages.]** *Forstwiss. Cbl.* 73 (3/4), 1954 (91–103). [G.]

Notes on the management of the Hienheimer forest, Bavaria, where regular management began ca. 1825.

1261. Kňazovický, J. Staré pisomnosti pri riešení niektorých lesníckych problemov. **[Utilizing old deeds for solving some forestry problems.]** *Les, Bratislava* 1 (5), 1954 (6–11). [Slovak.]

Quotations from deeds and writings of the 13th–18th centuries (oldest letter dated 1264) give clues to the species then growing in different parts of Slovakia.

1262. Jovanović, B. O šumama Srbije početkom XIX veka. **[The forests of Serbia at the beginning of the 19th century.]** *Šumarstvo* 7 (3), 1954 (140–58). 56 refs. [Serb.f.g.]

Early in the 19th century, probably ca. 80% of the total area of Serbia was under forests, mainly Oak, different communities of which grew on areas up to 700 m. alt.; higher, up to 1700 m., the following communities existed: *Fagetum montanum, Abieto-Fagetum, Fagetum subalpinum, Pinetum nigrae sylvestris* and *Piceetum omoricae* (locally); above 1700 m., *Piceetum abietis serbicum.*

1263. Vajda, Z. Prilog poznavanju historije postanka našeg golog krša. **[Origin of the barren karst in Jugoslavia.]** *Šum. List* 78 (4), 1954 (166–74). [Croat.]

Describes the history of the Adriatic coast since the Crusades, and the effect of political and economic events on forest utilization in Croatia and Dalmatia.

903. *Forest Policy, General*

1264. MacGregor, J. J. **France's post-war forest policy.** *Quart. J. For.* 48 (3), 1954 (167–78).

The policy associated with the National Forestry Fund and the problems which it has posed for the administration are described. The variety of the forms of assistance for private woodlands and the method of finance have provided a flexibility which has been enhanced by some recent changes of emphasis in the regulations. *Author's summary.*

1265. Lihtonen, V. Metsiemme tulevan kehityksen äärivii̇voja. **[The future development of Finnish forests.]** *Commun. Inst. for. Fenn.* 40 (22), 1952. pp. 42. 29 refs. [Fi.e.]

Analysis of data from successive national forest surveys reveals the inadequacy of productive growing stock. Measures necessary for improving it are discussed.

1266. Gill, T. **Forest policy and program for Taiwan.** *Forestry Series, Chinese-American Joint Commission on Rural Reconstruction, Taipei, Taiwan* No. 2, 1952. pp. 15.

Cf. *For. Abstr.* 16 (No. 1291).

1267. Donis, C. Sur quelques éléments de politique forestière tropicale. **[Some elements of forest policy in the tropics.]** *[Proc.] 1st Conf. for. interafric., Abidjan 1951,* 1952 (395–9). 2 refs. [F.]

Discusses the economic bases, using the Belgian Congo as an example, of forest policy to cover (*a*) domestic and local industrial, and (*b*) export production. For (*a*), fuel being a major requirement, coppice systems are indicated. Integrated land-use allocations will have to cover the forest requirements of industries and populations in their final and generally closer-grouped distributions, and forests, which must be close to markets, will in some cases have to have first call on the more highly productive sites. The scale, financing, and location of management units should follow a minimum programme which should sometimes include the provision of forest products for neighbouring areas less well

endowed but adequately connected by rail etc. For (*b*), highly productive sites along good communications are required, the Congo river system, with its 12,284 km. navigable to 40-ton barges, being of particular interest in this connexion. The extensions of the Guinea forest by galleries out into the savannas demand a special silviculture. The area of export production, though integrated with agriculture and local animal husbandry, should have first call on land, power and labour. Specialization and wood products should be stepped up to increase intrinsic values, and private enterprise capital, with due safeguards in the public interest, should be encouraged in exploitation. Compensatory areas replacing existing worked-out forest may have to be selected and general allocations of land for forest use must be made early. All rights should be purchased outright. All forests should be managed by the forest department with complete liberty of action and authority under plans backed by legislative sanction. To underline the importance of good policy, the example of the Indian Forest Service is called to mind.

1268. BELLOUARD, P. Rapport fédéral de l'A.O.F. **[Report on the French West Africa federation.]** [*Proc.*] *1st Conf. for interafric., Abidjan 1951*, 1952 (33–120). [F.e.]

Details the progress in reservation in 7 administrations and describes methods and results in close planting, enrichment by strips and natural regeneration, particularly for rain forest in the Ivory Coast; covers also artificial regeneration of the savannas with indigenous and exotic spp., treating Teak in some detail.

1269. JOUVANCEAU, J. Rapport du Niger. **[Report on the Niger.]** [*Proc.*] *1st Conf. for. interafric., Abidjan 1951*, 1952 (153–62). [F.e.]

Covers policy, customary rights, communal forests, taungya, fire protection, exotics, forest fallows, and conservation in the Sahel. Communal plantations of *Borassus* and *Hyphaene* and the encouragement of Date Palm cultivation receive particular attention.

1270. FAURÉ, M. Rapport du Soudan. **[Report on the French Sudan.]** [*Proc.*] *1st Conf. for. interafric., Abidjan 1951*, 1952 (137–52). [F.e.]

Covers forest policy, native rights, fire protection and the forest-fallow/shifting-cultivation balance, etc. Subsistance crops require 1 ha. and export crops 0·3 ha. with a 10-year rest. Not more than 20% of the available farming area should be cultivated at one time.

1271. CIVATTE, L. Rapport sur certaines questions forestières en Haute-Volta. **[Report on forestry in the Upper Volta.]** [*Proc.*] *1st Conf. for. interafric., Abidjan 1951*, 1952 (227–40). [F.e.]

Covers forest policy, silviculture, shifting cultivation and education.

1272. FOURY, P. Rapport du Service des Eaux et Forêts du Sénégal et de la Mauritanie. **[Report of the Forest Department of Senegal and Mauritania.]** [*Proc.*] *1st Conf. for. interafric., Abidjan 1951*, 1952 (121–36). [F.e.]

Covers reservation with particular reference to land tenure, with some notes on silviculture, fire protection and conservation in the Sahel.

1273. **Report on Sierra Leone and the Gambia.** [*Proc.*] *1st Conf. for. interafric., Abidjan 1951*, 1952 (241–4). [E.f.]

Forest policy, silviculture, and education.

1274. ROUANET, R. Rapport sur la Guinée française. **[Report on French Guinea.]** [*Proc.*] *1st Conf. for. interafric., Abidjan 1951*, 1952 (187–213). [F.e.]

Gives details of 38 years' growth of *Pinus khasya* and *P. merkusii* on the Foutah Djalon Plateau (3000–4000 ft. altitude, 70–80 in. annual rainfall, 6 months very wet, 4 dry, sandstone soils) and suggests a silvicultural schedule with clear felling and natural regeneration at 50 years. These Pines are fire hardy at 6 years.

1275. PIOLANT, J. D'AVIAU DE. Rapport de la Côte d'Ivoire. **[Report on the Ivory Coast.]** [*Proc.*] *1st Conf. for. interafric., Abidjan 1951*, 1952 (164–86). [F.e.]

Details with some costs, natural and artificial regeneration work of various kinds in the rain forest and savanna, with particular reference to enrichment; includes data on shifting cultivation.

1276. **Report on the Gold Coast.** [*Proc.*] *1st Conf. for. interafric., Abidjan 1951*, 1952 (247–56). 1 ref. [E.f.]

Covers forest policy, silviculture, shifting cultivation and education.

1277. MICHON, P. Rapport du Service forestier du Dahomey. **[Report of the Dahomey Forest Service.]** [*Proc.*] *1st Conf. for. interafric., Abidjan 1951*, 1952 (215–26). [F.e.]

Covers forest policy, silviculture and shifting cultivation.

1278. CHOLLET, A. Rapport du Togo. **[Report on Togo.]** [*Proc.*] *1st Conf for. interafric., Abidjan 1951*, 1952 (269–82). [F.e.]

Covers policy, fires, and, in particular detail, the cultivation of Teak, now the national tree; reforestation in the savanna is also included.

1279. **Report on Nigeria.** [*Proc.*] *1st Conf. for. interafric., Abidjan 1951*, 1952 (257–68). [E.f.]

Covers forest policy and silviculture (including taungya).

1280. Rapport du Cameroun français. **[Report on the French Cameroons.]** [*Proc.*] *1st Conf. for. interafric., Abidjan 1951*, 1952 (283–322). [F.e.]

Full discussion of policy, rights, communal forests, natural and artificial regeneration, fires, range management in the drier savannas, and education.

1281. Rapport du Territoire du Tchad. **[Report on the Chad Territory.]** [*Proc.*] *1st Conf. for. interafric., Abidjan 1951*, 1952 (323–6). [F.e.]

Forest policy, silviculture, shifting cultivation, range management and education.

1282. TARIEL, J. Rapport du territoire du Moyen-Congo. **[Report on the Middle Congo.]** [*Proc.*] *1st Conf. for. interafric., Abidjan 1951*, 1952 (333–43). [F.e.]

Forest policy and silviculture, particularly of *Terminalia superba*.

1283. Rapport du Congo Belge. **[Report on the Belgian Congo.]** [*Proc.*] *1st Conf. for. interafric., Abidjan 1951*, 1952 (367–94). [F.e.]

Detailed review of policy and silviculture. To hold the forest-fallow balance in well forested regions, small holdings of 9 ha. divided into 18 annual areas of 50 ares are being allotted. Where forest land is scanty the ten-year plan includes an annual programme for the protection of 5000 ha. under woodland strips which will represent $\frac{1}{10}$th of the agricultural land put under protection i.e. 500,000 ha. in 10 years. A specialist team deals with the high eastern areas where soil degradation is aggravated by erosion.

1284. **Regional Report—British East Africa.** [*Proc.*] *1st Conf. for. interafric., Abidjan 1951*, 1952 (509–20). 2 refs. [E.f.]

Policy, silviculture, education.

1285. **Report on Northern Rhodesia.** [*Proc.*] *1st Conf. for. interafric., Abidjan 1951*, 1952 (503–8). [E.f.]

Policy, fire protection, shifting cultivation, silviculture and education.

1286. Cardoso, J. G. Alfaro. Rapport sur le Mozambique (Afrique Orientale Portugaise). **[Report on Mozambique (P.E.A.).]** [*Proc.*] *1st Conf. for. interafric., Abidjan 1951*, 1952 (546–50). [F.]

Two-thirds of the country is under forest. The situation created since the end of the war by the great expansion in timber operations is only now being met by a reorganization and increase in the forest service. In 1951 timber exploited was 129,543 cu.m. with 79,277 tons exported. Fuel cut was 299,978 steres. Of the 70 timber species known in trade, the most important are, *Pterocarpus angolensis, Afzelia quanzensis, Khaya nyasica, Miletia stuhlmannii, Chlorophora excelsa, Dalbergia melanoxylon, Erythrophleum guineense, Amblygonocarpus obtusangulus* and *Androstachys johnstoni*. Stands of the last are now all included in forest reserves, of which there are 14, covering 460,173 ha., with 11 other areas under consideration. The following are being planted: Pines, *Juniperus* spp., Eucalypts, Teak, *Afzelia* and *Pterocarpus angolensis*. Dune fixation with *Casuarina* covers 1288 ha.

1287. Rapport de Madagascar. **[Report on Madagascar.]** [*Proc.*] *1st Conf. for. interafric., Abidjan 1951*, 1952 (521–44). [F.e.]

One-half of the forested area (13% of total land area) is provided by the primary formations of the West and South, deciduous forest and xerophytic bush respectively, the other half is degraded secondary forest. The rest of the island carries poorly wooded savanna. About 424,000 ha. have so far been reserved and the area scheduled for reservation should bring the total to 3,027,000 ha. The topography, agriculture practices and general lack of control make conditions for forestry worse in this country than in most in Africa. The crippling effect of having forests at the mercy of local interests (here under provincial councils) is emphasized. A few indigenous trees may prove amenable to silviculture (*Afzelia* sp., *Gluta turtur, Terminalia* spp., and *Cephalanthus spathelliferus*) but the main work is being done with exotics: Teak, the exotic conifers of South Africa, and Eucalypts, Acacias, Casuarinas etc., from the southern winter-rainfall regions of Australia [mainly those used in E. Africa and the Congo]. More appropriate and recommended summer-rainfall species from the Northern Territory and some Pines are to be tried at 5 experiment stations representative of the regions of the island. These species are *Eucalyptus miniata, E. tetrodonta, E. bleeseri, E. clavigera, E. grandiflora, E. papuana, E. setosa, E. phoenicea, E. spenseriana* and *Callitris intratropica*.

904. *General Regional Accounts of Forests and Forestry*

See also Nos. 1, 9.

1288. Reed, J. L. **Forests of France.** Faber & Faber Ltd., London. 1954. pp. 296 + 9 photos. Price 21*s*.

A non-technical description of forests and forestry, including an account of the Administration des Eaux et Forêts.

1289. Iablokoff, A. K. Un carrefour biogéographique: le massif de Fontainebleau: écologie des réserves. **[A biographical cross-roads: the forest of Fontainebleau: the ecology of the reserves.]** Société d'Édition d'Enseignement Supérieur, Paris. 1953. pp. 98 + 12 plates + 17 gphs. [F.] [Price 31*s*. 6*d*.]

A study of the biocoenosis in the ecological reserves (bioclimate, geology, vegetation, fauna), with an attempt to deduce the original state of the forest and the effect on its climate, vegetation and fauna of changes in the forest caused by exploitation, planting etc. [Cf. *For. Abstr.* 14 (Nos. 2974, 3562).]

1290. To Hellēnikon dasos. **[The Greek forest.]** Genikē Dieuthunsis Dasōn, Hypourgeion Georgias [, Athens]. [1954]. pp. 42. [Gk.F.]

A profusely illustrated booklet, in popular graphic style, covering all major aspects of Greek forestry and including many factual data. There are separate sections on: the Greek forests, production, mountain employment, government forest working, roads and extraction, erosion and torrents, torrent control, reforestation, nurseries, improvement of mountain pastures, forest buildings, game [protection and shooting], location of erosion control works, nurseries and sawmills (mapped), expenditure, and revenue (timber, fuel, charcoal and resin) from 1948 to 1952.

1291. Zehngraff, P. **Forest conditions in Taiwan.** *Forestry Series, Chinese-American Joint Commission on Rural Reconstruction, Taipei, Taiwan* No. 1, 1951. pp. 59.

Includes data and recommendations on: land use, forest statistics, forest and timber management, reforestation, coastal windbreaks, research and a proposed forestry programme. [Cf. *For. Abstr.* 16 (No. 1266).]

1292. Leuchars, D., Swabey, C., and Dawkins, H. C. **Notes on a visit to the Imatong mountains,**

Southern Sudan, March 1954. *Tech. Note For. Dep. Uganda* No. 6/54, 1954. pp. 13.

Covers silviculture, extraction, utilization and, for the lowland forests, ecology.

1293. ROSEVEAR, D. R. **Vegetation, forestry and wildlife in Nigeria.** Crown Agents for the Colonies. [1953]. pp. 35 + 2 maps. (Extract from *The Nigeria Handbook* 1953.)

Contains 35 pp. of description quoting characteristic and common spp. and areas for the mangrove, swamp and rain forests and the 3 types of savanna. Forestry (32 pp.) is treated historically under staff, legislation, reservation, management, production and finance. The third section (31 pp.) treats of the animals, mainly on an ecological basis [for systematy see *For. Abstr.* 14 (No. 3022).]

1294. SMITH, E. E. **The forests of Cuba.** *Publ. Maria Moors Cabot Found.* No. 2, 1954. pp. 98 + 2 maps. 37 refs.

Describes soils, climate etc., and vegetation types and the existing forests in some detail and with reference to land use (shifting cultivation etc.). The forests are divided into two main classes—Pine and broadleaved—the distribution of which is apparently related to the inability of broadleaved trees to compete with Pine on some sites, and the absence of Pine (mainly *P. caribaea*) from limestone areas.

1295. **Forest practice survey report.** Northeast Pulpwood Research Center, Gorham, New Hampshire. 1952. pp. v + 191. Price $3·50.

The report, arranged under states (Maine, New Hampshire, Vermont, Massachusetts, Connecticut, Rhode Island, New York and Pennsylvania) gives data on forest practices, classification of cutting practices, condition and silvicultural requirements of the major forest types.

1296. Cartilla agrícola-forestal de la provincia de Buenos Aires. **[Basic information on agriculture and forestry in Buenos Aires province.]** *Publ. misc. Minist. Agric. Argent.* No. 370, 1953. pp. 285 + 30 maps + 4 tbls. [Span.]

Contains a section on the forests, giving information on the different forest regions, the main species found there and afforestation methods.

1297. KOTSCHWAR, A. Forst- und holzwirtschaftliche Übersicht Kolumbiens. **[A survey of forestry and forest products in Columbia.]** *Int. Holzmarkt* 43 (26), 1952 (19–22); 44 (1), 1953 (23–6). 85 refs. [G.]

905. *Forest Statistics and Resources*

See also Nos. 317, 488.

1298. DUGELAY, A. Les forêts provençales. La production forestière dans le département du Var. **[Forests of Provence. Forest production in the Département du Var.]** *Rev. Bois Appl.* 9 (5), 1954 (9–16). [F.]

Includes sections on: firewood, lumber, cork and minor forest products.

1299. ILVESSALO, Y. **Development of the Finnish forest resources from 1921–24 to 1951–53.** *Finnish Paper & Timber, Helsinki* 5 (6), 1954 (76–8). [E.]

Tabulates and discusses data from 3 national forest surveys (1921–24, 1936–38 with revisions in 1944, and 1951–53) on forest area, growing stock, and annual increment.

1300. Danmarks skovareal 1950. **[Danish forest-area statistics for 1950.]** *Dansk Skovforen. Tidsskr.* 38 (4), 1953 (343–54). [Dan.]

1301. Oversigt over de danske Statsskoves udbytte af ved og penge for finansåret 1952–53. **[Review of the timber and financial yields of the Danish State Forests for the financial year 1952–53.]** Nielsen & Lydiche (M. Simmelkiær), Copenhagen. 1954. pp. 16 + 1 tbl. [Dan.]

1302. SETTEN, G. G. K. **What does Malaya get from the forest?** *Malay. Forester* 17 (3), 1954 (114–28). 5 refs.

Gives figures for production, consumption, utilization and financial return from timber and minor forest products.

1303. **National forest areas June 30, 1953.** Forest Service, U.S. Department of Agriculture, Washington. 1953. pp. 16.

Areas (*a*) by forest regions, (*b*) by states, of (1) national forests, (2) land utilization units, (3) national game refuges, (4) custodial projects, in the U.S.A.

1304. LAMB, F. B. **The forests of Darien, Panama.** *Carib. For.* 14 (3/4), 1953 (128–35).

The volume of Mahogany (*Swietenia macrophylla*) exploitable in the whole of Panama is estimated at ca. 60,000,000 bd. ft., of which 50,000,000 bd. ft., are located in Darien. Resources of Cativo [*Prioria copaifera*] in Darien are estimated at more than 500,000,000 bd. ft. A review of these and other timber resources of the province is presented, with an estimate of costs and returns from Mahogany plantations.

907. *Indirect Significance of Forests (Rural Amenity, National Parks, Forest Influences etc.)*

See also section 116 and No. 417.

1305. WALTON, J. **Queen Elizabeth Forest Park guide: Ben Lomond, Loch Ard and the Trossachs.** H.M. Stationery Office, Edinburgh. 1954. pp. 80 + map. Price 3*s.* 6*d.*

91. LAND USE, LAND-USE POLICY (INCLUDING AFFORESTATION POLICY)

See also Nos. 472, 607, 1267 *et seq.*, 1294.

1306. L., M. [Editor?]. Fásitás a népi demokratikus országokban. **[Afforestation in the People's Democracies.]** *Erdö* 2 (3), 1953 (205–11, 292, 296). [Hu.russ.e.]

Includes the following data:

Albania: The Germans felled 15,687 ha. of forest for war purposes. Following a drought (1945) and disastrous floods (1946) the two-year plan of 1949–50 made special provision for forest rehabilitation. This was followed in 1951 by a five-year plan for planting or rehabilitating 27,800 ha. of forest. The first year's target of 1300 ha. was exceeded by 700 ha. Altogether 6000 ha. have now been afforested under

the new form of government. In 1952 work in coastal districts was given priority, conifers, Eucalypts and Poplar being chiefly planted. Albania's nurseries are producing 16 million plants a year. In 1951 alone, 22 new nurseries were established, and these have raised 7 million plants of different species.

Bulgaria: The new Republic inherited 800,000 ha. of land made barren by erosion. 15,000 ha. were planted in 1947, 25,000 ha. in 1948, 50,000 ha. in 1949, over 52,000 ha. in 1950. Some 41% of the plants were Oak, 30% conifers. In the southern Dobruja, large-scale works were begun in 1949 for soil improvement, planting of shelterbelts, building of irrigation systems and grass crop rotations. [A sketch-map of these irrigation schemes and shelterbelts is given.] For the shelterbelts alone the Government has allocated 500 million Lev. Within 5 years nine State shelterbelts 18–30 m. wide and with a total length of 795 km. are to be planted. In Oct. 1951 a twelve-year afforestation plan was approved, to cover 1 million ha. In 1952, 1300 tons of seed were collected. By 1954 over 650 ha. of new nurseries had been established. Meanwhile, in 1952 some 60,000 ha. were planted, in 1953, 65,500 ha.

Czechoslovakia: The five-year plan (1949–53) provides for an increase of 231,000 ha. in the forest area, 76,000 ha. for soil conservation and climate improvement, 10,000 ha. to afforest barren areas and as protective planting along mountain streams and rivers. Shelterbelts are being created in specially dry districts.

Poland: Under the German occupation Poland lost 75 million cu.m. of timber, representing 28% of the standing crop, including ca. 1 million ha. of the best and oldest forests. In 1949 increment was estimated at 1·7 cu.m./ha., compared with 2·3 before the war. It is planned to afforest 1 million ha. of deteriorating land over 15 years. Within 40 years another 1·5 million ha. unsuitable for agriculture are to be planted to increase the timber resource. This should restore the proportion of Poland under forest to its pre-war level of 25%. Under the three-year plan (1947–49), 348,100 ha. were planted or rehabilitated. The six-year plan (1950–55) gives priority to the creation of shelterbelts, 135,000 ha. being planted in 1951, and provides for an increase of 23·5% in the area under forest. Priority is given to quick-growing species of special industrial value. The planting of trees and laying out of parks in towns is a special problem in Poland, owing to the devastation caused by the Germans. In 1951 about 2000 parks were laid out in towns and workers' settlements. In 1952 extensive green belts were established near Warsaw, along the Vistula, and also in Silesia and in some other cities. In Warsaw itself 1100 ha. are to be planted and laid out in parks by 1955.

Hungary: Under the three-year plan, 10,670 *hold* were planted. Under the new five-year plan, 570,000 *hold* are to be afforested, and the extent of irrigated land is to be increased fivefold. In the area between the Danube and Tisza, 28,000 *hold* are to be planted to fix shifting sand. A 20-year plan has been worked out. [Cf. *For. Abstr.* 14 (No. 3252).]

Rumania: In northern Dobruja 100,000 ha. of formerly rich forest land now chiefly marsh, are to be afforested. Along the Danube/Black-Sea Canal, now building, 11 nurseries have been set up, which provide 10 million plants a year. In 1951, 15,000 ha. were planted in the Dobruja alone. Along the Danube/Black-Sea Canal 200 km. of shelterbelt have been planted. In other parts of the country, 10,000 ha. of nurseries were established in 1949, 11,000 tons of seed were collected, and 84,000 ha. afforested followed by another 60,000 ha. in 1950. Under the five-year plan (inaugurated 1951) the target is 390,000 ha.

China: The existing 5% of the land surface under forest is to be increased to 20% over 30 years. In North China 27 million trees were planted in 1949, and more than 20 million in 1950, in which year also a start was made on the great north-eastern shelterbelt [sketch-map given]. In 1950, in China as a whole, almost 2 million *mu* [125,000 ha.] were planted with 400 million young trees. In 1951, 425,000 ha. were planted, plus over 780,000 ha. of barren areas. The first shelterbelt, started in 1952, will be 1700 km. long. There is a great need for technical staff. In old China, 18 forestry faculties took scarcely 100 students a year. In 1950, 657 students began their courses at forestry high schools. In many places two-year technical courses are being held, with at present (1953), 1132 students. Shorter courses, mainly of a practical nature, are being taken by 3847 students. In North China drought-resistant species are being planted, in Central and South China species of industrial value, including Mulberry and Camphor.

1307. Sukačev, V. N. Osnovnye zadači nauki o lese i seljskoe hozjaïstvo. **[Basic tasks of forest science in relation to agriculture.]** *Priroda, Moskva* 43 (5), 1954 (3–11). [Russ.] A.P.B.

The average annual timber consumption of Soviet agriculture, estimated at 175–200 million cu.m., is met to a large extent from the 90 million ha. of kolkhoz forests, while the rest is derived from the State forest (ca. 1100 million ha.). The kolkhoz forests could easily increase their output if they were better managed and reorganized. In order to reduce the excessive drain on State forest resources by agriculture, particularly in areas where forests are relatively scarce, it is necessary to extend these forests in the forest steppe and steppe regions where their water-conservation and sheltering role cannot be overestimated. In other parts of the U.S.S.R. where coniferous forests are abundant, it is advisable to convert forest into arable; this is permissible, since the estimated annual volume increment in the whole of the U.S.S.R. is at present roughly twice the volume of fellings. The northern boggy forests, peat bogs and boggy meadows, which total ca. 230 million ha., should be gradually drained. This would contribute to the northward shift of the northern boundaries of many forest species and agricultural crops. In the southern arid and semi-arid regions, the part played by shelterbelts is described in some detail; several methods of afforestation, used in the semi-arid south-eastern region of Russia, are discussed.

1308. RYŠKA, A., and HERMUTH, B. Správné provádění delimitace zemědělského a lesního půdního fondu. **[The right division between agricultural and forest soils.]** *Za social. Zeměd.* 4 (6), 1954 (597–603). [Cz.] C.G.B.

In accordance with the decision of Czechoslovak authorities in 1953, the work on delimitation of agricultural and forest soils is to be completed by 1959. Preliminary delimitation was carried out in 1953. Criteria for what are arable land, meadows, pasturages, vineyards, orchards, and fish-ponds have been worked out by the Czechoslovak Agricultural University. Forest soils will comprise: (1) the present forest areas, with the exception of any claimed by agriculture, and (2) those agricultural soils that must be afforested for water-management, erosion-control, and other reasons; they will be divided into: (1) soils requiring improvement (anti-erosion, or the like), (2) soils for uneconomic forests (because of low rainfall, shallow soil, or gradient), and (3) the rest.

1309. PATRONE, G. Aspetti del problema agrario e forestale della montagna Molisana. **[The problem of agriculture and forestry in the mountains of Molise.]** *Ital. for. mont.* 9 (3), 1954 (140–8). [It.it.f.]

A discussion of land-use policy.

1310. MERENDI, A. Aspetti del problema forestale e montano nel mezzogiorno d'Italia. **[The forest and mountain problem in South Italy.]** *Ital. for. mont.* 9 (3), 1954 (129–39). [It.it.f.]

Discusses land-use problems and recommends much greater use of afforestation by 'gradoni' [terraces] on mountain slopes.

1311. MARTINEZ HERMOSILLA, D. P. La repoblación forestal en España y su importancia para la agricultura y la economía pública. **[Reforestation in Spain and its importance for agriculture and public economy.]** *Montes, Madrid* 10 (57), 1954 (167–72). [Span.]

Past achievements and present policy in the conservation and improvement of existing forests, and in reforestation.

1312. TORTORELLI, L. A. El Delta del Paraná, productor permanente de maderas. **[The Paraná Delta, source of a permanent timber supply.]** *Repr. from Rev. Fac. Agron. Vet., B. Aires* 13 (2), 1952 (193–217). [Span.span.e.]

Discusses, with particular reference to climate and soil, the suitability of this region for the production of rapid-growing timber trees, reviews aspects of the world market, and recommends silvicultural systems suitable for growing Poplar, Willow, Oak (*Quercus robur*), *Platanus acerifolia* and *P. occidentalis* in the Delta.

1313. **[Development of Mangrove swamps for rice growing.]** In *Colonial Territories 1953–54*, H.M. Stationery Office, London. 1954 (120). *Cmd.* 9169.

Investigations into the development of Mangrove swamps for rice growing continued in W. Africa. Successful crops were raised on trial plots reclaimed from Mangrove in the Niger delta. In Malaya a study of the sulphate swamp soils similar to Mangrove soils was continued.

92. FOREST OWNERSHIP AND OWNERSHIP POLICY

See Nos. 1314–5.

93. PUBLIC SUPERVISION AND REGULATION OF FORESTRY, INCLUDING LEGISLATION FOR THESE PURPOSES

See also No. 1143.

1314. MARSH, R. E. **Public policy toward private forest land in Sweden, Norway and Finland.** Charles Lathrop Pack Forestry Foundation, 1214 Sixteenth Street, N.W., Washington 6, D.C. 1954. pp. vii + 80. 60 refs.

Includes details on the administration of private forestry and on legislation controlling fellings, replanting etc.

1315. LETZGUS, E. V. Étude de législation comparée des limitations au droit de propriété en matière forestière en France et dans des autres pays européens. **[A comparative study of legislation limiting forest ownership in France and other European countries.]** *Rev. int. Bois* 21 (192/193; 194/195), 1954 (99–104, 118; 123–8). [F.]

1316. TISSEVERASINGHE, A. E. K. **Notes on forest law [in Ceylon].** *Ceylon Forester (n.s.)* 1 (4), 1954 (112–30).

1317. WADSWORTH, F. H. **Our efforts to conserve trees.** *Carib. For.* 14 (3/4), 1953 (140–5). 6 refs.

A short history of forest conservation in Puerto Rico, with recommendations for the future.

1318. SWINGLER, W. S. **The forest service and private forestry.** *J. For.* 52 (7), 1954 (484–6).

Traces the history since 1891 of the extension work of U.S. and State foresters for the better protection and management of private forests. The Norris-Dixey Act (1937) is the starting point of the present extension Service. Co-operative fire control and tree planting programmes now operate in 43 and 45 States respectively. Advice in forest management and processing is now given in the field by 39 States through 270 extension foresters, and the work of protecting and rehabilitating 62 million acres of poorly stocked privately owned land is being supported by numerous clubs, movements and private persons.

1319. FROST, S. L. **The Dexter case.** *J. For.* 52 (8), 1954 (579–82). 2 refs.

The Forest Practice Act (1945) passed by the Washington State legislature aims at keeping private forest lands productive. Logging must be done only under state permit and this lays down rules on the number and kinds of trees to be reserved, though acceptable alternative methods are allowed. Failure to comply entails possible closure of operations and the exaction of a deposit of up to $8 per acre of a mismanaged area, returnable if at the end of 5 years the area is successfully regenerated or if not applied to this purpose by the state. Release from the provisions of the Act is allowed if the owner requires to turn the property to other use. In a test-case brought by a local timber owner and carried to the

Supreme Court of the United States the constitutionality of the Act was upheld. Extracts from the judgments of this and of cognate cases are given. The precedent has now been set for similar regulatory acts.

1320. **Reports of the West Coast forestry procedure committee. Report No. IX. Forest practices for the Douglas Fir region.** Western Forestry and Conservation Association, Portland, Ore. 1954 (67–78).

Proposed minimum acceptable standards include reservation of seed sources or artificial regeneration, to provide medium stocking within 5–10 years of felling and slash disposal; forest protection to keep annual burned-over area below 0·25% of the area; and full use of raw material. [Cf. *For. Abstr.* 12 (No. 2530).]

94. OTHER METHODS TO IMPLEMENT FOREST POLICY

See also Nos. 1264, 1318.

945.2. *Publicity, Propaganda (including Demonstration Forests)*

1321. **Forest and water research project: Delaware-Lehigh Experimental Forests. Reports 1 and 2.** Department of Forests and Waters, Harrisburg, Pa. 1951; 1953. pp. 44; 46. 8 refs.

The first of these reports gives an account of the experimental forest, studies under way, and further studies planned, and the second is a progress report on these studies, notably the conversion of scrub Oak to productive forest, and management of catchment areas. Tabulated data are given on precipitation, stream flow, interception, soil moisture, water quality, soil freezing, climate, groundwater/stream-flow relation, evapo-transpiration losses and water balance.

1322. **The University of the South Forest.** Forestry Department, University of the South, Sewanee, Tennessee. 1953. pp. 124 + map. 17 refs.

An account of this demonstration forest together with a working plan for the next 10 years.

1323. **World festival of trees.** *FAO For. Developm. Pap.* No. 2, 1954. pp. 74.

A report on the observation of arbor days, tree festivals etc., based on replies to a questionnaire sent to member countries. [Cf. *For. Abstr.* 14 (No. 4037).]

945.3. *Education. Training*

See also Nos. 1273–4, 1276, 1280–1, 1283–4, 1287, 1321–2.

1324. ANDERSON, M. L. **Forestry education in Scotland 1854–1953.** *Scot. For.* 8 (3), 1954 (114–26).

1325. **Forestry schools in the United States.** U.S. Forest Service, Washington. Rev. 1953. pp. 9.

945.4. *Research*

See also Nos. 109, 326.

1326. MACDONALD, J. **Forestry research and experiment in Scotland, 1854–1953.** *Scot. For.* 8 (3), 1954 (127–41). 37 refs.

A survey of the principal subjects investigated and experiments carried out.

1327. Au service de l'agriculture congolaise: l'Institut National pour l'Étude Agronomique du Congo Belge (INÉAC). **[In the service of Congo agriculture: INÉAC.]** Institut national pour l'Étude agronomique du Congo-Belge, Brussels. 1954. pp. 100 + 4 maps + 32 photos. [F.]

An account of the organization of research and the various research centres.

1328. WORTHINGTON, E. B. **A survey of research and scientific services in East Africa, 1947–1956.** *Paper, East-Africa High Commission, Nairobi* No. 6, [1953]. pp. 79.

A survey of the organization of research, with some account of projects in progress and planned, including those sponsored by E.A.A.F.R.O.

1329. RICHEN, C. W. **Forest research developments in the Douglas Fir region.** *J. For.* 52 (7), 1954 (520–1). 1 ref.

1330. ISRAELSON, M. A. [Compiler]. **Publications of the Intermountain Forest and Range Experiment Station, 1912 through 1952.** *Res. Pap. Intermt. For. Range Exp. Sta.* No. 29, 1952. pp. 45.

The list is arranged alphabetically under authors' names within broad subject heads.

946.2. *Conferences and Excursions*

1331. Bois et forêt: Actes officiels du Congrès national du Bois [: Sessions 1–4]. **[Proceedings of the [French] national timber conference, sessions 1–4.]** Cie. Française d'Editions, Paris. [1954]. pp. 908 + 19 plates. [F.]

Contains the papers, reports and discussions of the first four sessions of this conference, held at different places and times in 1953: the fifth and final session took place in March and April 1954 and its proceedings will be published later. Session I dealt with the forest and afforestation in France and French overseas territories, and was divided into 7 sections: (1) forest statistics, (2) silviculture and forest management (general trends), (3) forest protection, (4) afforestation policy, (5) afforestation in relation to soil conservation, (6) technique of afforestation (7) regional studies. Section II dealt with timber production and utilization in 4 sections: (1) forest exploitation and primary conversion, (2) timber industries in France, (3) exploitation and conversion in overseas territories; (4) general studies on storage, conversion, seasoning etc. Session III was devoted to pulp, fibreboard, chemical industries and wood distillation, cork, resin tapping (including management and silviculture of *Pinus pinaster* and utilization of its wood). Session IV dealt with the timber trade, imports and exports. The papers in all sections are mainly short and of a general nature.

97. INTERNATIONAL FOREST POLICY AND OTHER INTERNATIONAL COLLABORATION

971. *Congresses, Conferences*

1332. Première conférence forestière interafricaine. (Abidjan 4–12 décembre 1951.) **[The first Interafrican Conference [held under the auspices**

of the Committee of Technical Co-operation for Africa South of the Sahara].] Centre Technique Forestier Tropical, [Nogent-sur-Marne, France]. 1952. pp. xiv + 562. 38 refs. [F. or E.]

Gives the replies of 16 French, 8 British, 7 Belgian and 2 Portuguese administrations to a questionnaire and the resolutions passed on these replies after a discussion by 50 delegates. The points covered are general policy, the formation and securing of the forest estate, rights, communal forests, taungya, bush fires, finance, propaganda, training and education, terminology, exploitation, regeneration, exotics, and balance of shifting cultivation and forest fallow, and conservative range management in the Sahel and in the Sudan savanna. Resolutions of special note are: that all forests belonging to local communities should be managed by the forest department; that further research should be carried out on the efforts of fire on vegetation and soil and on its use in agriculture and stockraising with a view to reducing its harmful effects; that silviculture should be financed by block grants covering a period of years; that, for making vegetation maps, territories should compile a complete list of their plant formations on the basis of the classification of Aubreville [cf. *For. Abstr.* 11 (No. 134)] who should collate terms and report to the next conference. Individual papers and reports are abstracted in this issue of *Forestry Abstracts*, using the abbreviated form of citation: [*Proc.*] *1st Conf. for. interafric., Abidjan* 1951.

1333. **Report of the Near East Poplar Conference (Damascus, Syria 5–9 April 1954)**. FAO, Rome. No. *FAO/CIP*/72, 1954. pp. 35.

Includes recommendations by the conference on policy, identification and cultivation, logging and utilization, sample forms relating to identification, cultivation and use and measurement of wood samples at time of felling, and a paper; Information gathered on the study tour (*J. Pourtet*), on Poplars and other tree species in Syria and the Lebanon.

FORESTRY THE WORLD OVER

References: 1. *Chêne-Liège*, Constantine; 2. *E.C.E. Press Release*, Geneva; 3. *Forestry News of Latin America*, Rome; 4. *India News*, London; 5. *Indian Forester*, Dehra Dun; 6. *Journal of Forestry*, Washington; 7. *Mimeo Forestry & Timber Bureau*, Canberra; 8. *Monti e Boschi*, Milan; 9. *Nature*, London; 10. *O.E.E.C. Press Release*, Paris; 11. *Priroda*, Moscow; 12. *Pulp & Paper Magazine of Canada*, Gardenvale, Que.; 13. *Skogen*, Stockholm; 14. *Southern Lumberman*, Nashville, Tenn.; 15. *Timber Trades Journal*, London; 16. *Timberman*, Portland, Ore.; 17. *Times*, London.

International.

A conference (London, 11–15 October 1954) has been organized by the European Productivity Agency of the O.E.E.C. with the co-operation of the British Standards Institution and the Building Research Station of the United Kingdom, to discuss the advantages and standardization of the modular system, by which the sizes of all building materials, components, and equipment (including doors and windows) are co-ordinated in terms of a fixed basic dimension known as the module. The conference will make arrangements for collecting and collating the results of research on the subject, which will be discussed and approved at an international meeting in Paris in 1955 (**10**; 7.10.54).

The European Productivity Agency of the O.E.E.C. has set up a mission to study and report on the use and grading of wood waste, chipboard, and fibreboard in Europe. Its main purpose is to study ways and means of reducing the extent, and making better use, of waste derived from forests (including wood for which there is at present very little demand, e.g. inferior coppice) and from the wood-using industries (**15**; 16.10.54).

Two international protocols have been agreed on by delegates from 16 European countries in the E.C.E. They cover standardization and quality control of fruit and vegetables in international trade, and standardization of wood packaging for them. The general provisions of the latter specify that packaging should be new and of the non-returnable type. Internal and external dimensions for various categories of box are included on an experimental basis for 2 years (**2**; 8.10.54).

A symposium on research and development in Indian essential oils and aromatic chemicals was held at Dehra Dun from 27 to 30 September 1954 (**5**; September 1954).

The member governments of the Commission for Technical Co-operation in Africa South of the Sahara (Belgium, France, the Federation of Rhodesia and Nyasaland, Portugal, the Union of South Africa, and the United Kingdom) have signed in London a Phyto-Sanitary Convention for Africa south of the Sahara. Its objects are to prevent the introduction of plant pests and diseases and other enemies of plants into any part of this region, to eradicate or control any that are at present there, and to prevent their spread. An Inter-African Phyto-Sanitary Commission to implement the convention has been set up, on which each of the participating governments will be represented. The Commission is to have a scientific secretary, and a permanent committee of information is to be set up in London, consisting of the directors of the Commonwealth Institutes of Entomology and Mycology and the scientific secretary. This committee will act as intermediary between the two Institutes and the Commission (**9**; 16.10.54).

Australia. A card sorting system for the botanical identification of species of the genus *Eucalyptus*, developed by N. Hale and R. D. Johnston, has been published by the Forestry and Timber Bureau, Canberra, and is available from August 1954. The key comprises 551 cards. The price is £A5 5*s*. 0*d*. plus packing and postage, and includes a pamphlet on the use of the key and drawings of buds and fruits at natural size that can be cut out and pasted to the cards. Only a limited number of sets is being prepared (**7**; 10.8.54).

British Honduras. The first plywood mill to be established in the country has been set up at Puerto Castillo on the northern coast. It will use Mahogany, Primavera and Cedar. Manufacture will be mainly for home requirements, though some may be exported (**3**; 1.10.54).

Canada. The construction of public roads will in future be a condition of forest management licenses in British Columbia. The licensee will be required to build the road to public highways standards. Such roads may either be turned over to public ownership and duly compensated for, or retained under private maintenance with amortization of costs compensated for (**15**; 20.11.54).

A formal report is being prepared by Canadian Government scientists on a long-range project to keep the St. Lawrence River ice-free all the year round. The basis of the plan involves using the heating action of warm water from Lake Ontario, which does not freeze during the winter, as an artificial warming agent for the entire St. Lawrence River (**15**; 27.11.54).

Ecuador. 'La Quinta Equinoccial', the country's first forest and conservation experiment station has been set up 22 km. north of Quito (**3**; 1.10.54).

Finland. A new pulping method, the Vilamo process, has been in use at the Yhtyneet Paperitehtaat's (United Paper Mills Ltd.) Tervassaari mills at Valkeakoski, Finland, for the past year and is being patented. No details of the process are published, but it is claimed that the cooking time is reduced by 30%, that wet and dry chips can be cooked together with yields equal to those for dry chips alone, and that the pulp obtained is whiter and more homogeneous (**13**; 1.10.54).

Great Britain. Cody's tree, the Pine tree to which Col. Cody the pioneer airman used to tether his aircraft, is preserved near the main entrance to the Royal Aircraft Establishment at Farnborough. The tree was killed about 1920 by oil spilt or thrown out from aircraft engines, and by 1949 was so rotten that a concrete plinth was cast round the trunk. A year ago it was cut down and stored till dry enough to impregnate. The smaller pieces were then soaked in a transparent synthetic liquid resin that sets a few hours after the addition of a hardener. The larger pieces and the trunk were covered with an impervious skin by a cocooning process. Through the skin many small pipes were fastened to the crumbling wood. A large vacuum pump sucked the air from the inside, the skin was pressed tightly round the soft wood, and liquid resin was poured through the pipes. The whole tree, weighing 400 lb., absorbed 450 lb. of resin. When the resin had set, the skin was stripped off. The pieces were then assembled and the tree re-erected (**17**; 6.10.54).

A new flame-proofing process for mining timber, developed by Hickson's Timber Impregnation Co. Ltd., was recently demonstrated at Craighead, Co. Durham. Treatment consists in spraying with a new chemical fire retardant known as F.B.103. Untreated wood, subjected to a temperature range of 150°–750° C. across the surface of a 13-in. plank, was scorched for more than 50% of its length in a few minutes. The treated plank, exposed to the same temperatures for more than twice the time, was scorched only by the highest temperature and then only for 1 in. of its length. The great advantage of this spray is that it enables mines to flame-proof untreated timber *in situ* (**15**; 27.11.54).

India. The Government of India have appointed Mr. A. Y. Goor of FAO to advise them on matters relating to the development and afforestation of Rajasthan desert. Mr. Goor, who was formerly Conservator of Forests in Israel, has set up his headquarters in Jodhpur. He will tour the desert area for 3 months and submit a report to the Government of India (**4**; 30.10.54).

Italy. The National Research Council, in co-operation with the State Forests and the University of Florence, has set up at Florence a National Timber Institute (Istituto Nazionale del Legno) with the following objects: (1) to encourage and co-ordinate timber research; (2) to collect, preserve, and diffuse documentation on timber research; (3) to encourage and facilitate exchange of ideas and publications with similar institutions at home and abroad, and (4) to contribute to the recruiting and training of research workers. The executive council of the new institute consists of Professors Pavari, Giordano (Director of the Institute), Biraghi and Pratolungo and Dr. Scalambretti (**8**; October 1954).

Malaya. The Department of Forestry has suggested that, to meet the crisis in the sawmilling industry, some of the 350 sawmills should be closed, and much greater use made of tractors in logging. Timber-traders' associations from all over Malaya have formed a body to be known as the Pan-Malayan Timber Merchants' Association for the purpose of making representations to the Government for a reduction in the royalty on timber (**15**; 2.10.54).

Morocco. A *Eucalyptus* study tour, organized in Morocco by the Administration des Eaux et Forêts in collaboration with FAO, took place during 24–30 October. Many plantations, an arboretum, and the Research Station at Rabat were visited (**1**; 15.11.54).

Southern Rhodesia. As from 1 April 1954, the Southern Rhodesia Forestry Department became the Southern Rhodesia Forestry Commission. It remains a territorial body, though all other bodies concerned with European agriculture are now transferred to the Federal Government.

U.S.A. Pulp companies in the United States now employ 1516 graduate foresters—an average of 9 for each of the 171 companies using pulpwood. More than half of them are engaged in forest management—868 compared with 263 so employed 7 years ago (**6**; October 1954).

A new light-weight portable fog maker, 'Swingfog', for spreading insecticides or fumigants is being manufactured by Devenco Inc., New York, N.Y. An open area of 2 acres can be covered by one operator in 20 min. and an enclosed space of 35,000 cu. ft. in 5 min. The 'Swingfog' consists of a simple pulse jet heater (started by contact with a 6-volt battery and a few strokes of the air-pump), fuel and insecticide tanks, a hand air-pump and an extension tube; it weighs about 30 lb. filled. The heater feeds an exhaust stream into the extension tube, the insecticide or fumigant is fed through a valve in the end of the tube, and the condensation when the exhaust hits the air makes a thick blanket-like fog; the heating period is very brief and the potency of the chemical is unaffected by it (**12**; August 1954).

Forest workers in Oregon are using coloured air photos in studying the current Douglas Fir bark-beetle outbreak. Beetle-killed trees stand out against the healthy green trees on the photos. Dead trees are straw-yellow to reddish-brown in the early stages; later they turn purplish, and finally grey (**6**; October 1954).

In a simple colour test developed by the Forest Products Laboratory, Madison, Wis., a solution of Alizarine Red S is applied to freshly-cut end surfaces of Southern Pine round stock (poles, piles, posts, etc.); decay-infected areas, even in the early stages, turn yellow and uninfected areas, or those attacked by relatively harmless sap-stain and mould fungi, turn red (**14**; 15.10.54).

Scraps and clippings, 1–1½ in. wide and 12–16 in. long, from roofing material have been successfully used to surface a muddy parking area at Gresham, Ore. The material is spread over the muddy area in summer when the heat will cause the tar to stick to adjoining pieces, giving a tightly-bonded surface, and the passage of cars over the surface mats it down into a solid mud-free base (**16**; October 1954).

U.S.S.R. In April 1954 the Forest Institute of the Academy of Sciences of the U.S.S.R. arranged a conference on the reclamation of waterlogged and boggy forest land, attended by research workers and practical foresters from many parts of the Union. All aspects of the subject, e.g. classification of the types of land involved, peat formation, regulation of the soil-water régime by silvicultural measures, drainage, regeneration and growth of forest trees on drained land, and fertilizer treatments, were discussed. Resolutions were passed calling for increased and co-ordinated research (**11**; August 1954).